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[OFFICIAL NOTICE.]

Third Annual Meeting, American Gas Institute.

AMERICAN GAS INSTITUTE HEADQUARTERS,
25–29 WEST 39TH ST., NEW YORK CITY, Oct. 1, 1908.

GENERAL ANNOUNCEMENT.

The third annual meeting of the American Gas Institute will be held at New York, N. Y., October 21st, 22d and 23d, 1908. The meeting will be called to order by the President, Alex. C. Humphreys, of New York, at 10 A.M., Wednesday, October 21st.

Meeting Hall and Headquarters.—The business sessions will be held in the Auditorium of the United Engineering Societies' Building, 29 West 39th street, between Fifth and Sixth avenues. The Auditorium is on the third floor of the building, and on the eighth floor are located the permanent headquarters of the Institute. On the days of meeting the Secretary and Treasurer's office at headquarters will be open from 9 A.M. to 6 P.M. When the Institute is not in session the President and officers will make their headquarters at the Hotel Astor, Times Square (Broadway and 44th street).

Members are particularly urged to write for their rooms at once and, in doing so, a reply should be requested, for which a self-addressed, stamped envelope should be inclosed, as misunderstandings may thereby be averted. The securing of rooms well in advance is important, as the hotels are liable to be well filled at this time of the year.

The banquet will be served at the Hotel Astor, Thursday evening, October 22d,

Roll Call.—The roll call will be made by means of the door card system. Each member upon entering the hall for the first time will, at the door, receive a special card upon which he will find his name, address, etc., as these appear in the Secretary's books, and such card should be corrected and returned to those in charge. Members should attend to this very carefully, as these cards are used immediately after the meeting for correcting the annual membership list. Visitors will please hand to the doorkeeper their personal cards.

The following list of hotels with rates is submitted:

Hotel.	Location.	Single Room.		Double Room.	
		Without Bath.	With Bath.	Without Bath.	With Bath.
Breslin	B'way, cor. 29th st....	$1.50	$2.50	$3.00	$4.00 up.
Gilsey.....	" " "	1.50	2.50	2.50	3.50 "
Imperial	" and 32d st	2.00	2.50	4.00	5.00 "
Martinique	" " 33d st.....	2.00	2.50	3.50	3.50 "
Herald Square.	" " 34th st....	1.50	2.00	2.50	3.00 "
Marlborough ..	" 36th and 37th st.	1.50	2.50	2.50	3.00 "
Knickerbocker.	" at 42d st.....	2.00	3.00	....	5.00 "
Astor.....	Times Square.....	2.50	3.50	3.50	4.50 "
Manhattan.....	42d st. & Madison ave.	2.00	3.00	4.00	5.00 "
Belmont.	" " " Park ave.	2.50	3.50	4.00	5.00 "
Grand Union..	" " " " ..	1.00	2.50	2.00	3.50 "
Holland.....	5th ave. and 30th st ...	2.00	3.50	3.00	4.50 "
Waldorf.....	" " " 34th st...	3.00	4.00	5.00	6.00 "
Savoy.....	" " 58th & 59th st..	2.50	3.00	3.50	4.50 "
Netherlands ..	" " and 59th st ..	2.00	3.00	....	5,00 "

The above prices are all minimum rates for one person in a room, European plan. Rates for two persons in one room may be obtained by communicating with whichever hotel may be selected.

Badges.—All members attending the meeting are particularly requested to bring their membership badges, as the Committee of Arrangements is preparing an identification badge for each member which will require the regular membership badge for its proper completion.

LIST OF PAPERS AND REPORTS.

The papers and reports to be read at the meeting are as follows:

List of Papers.

"High Pressure Distribution;" by Mr. Jacob D. von Maur, St. Louis, Mo.

"Benzol Enrichment;" by Mr. E. H. Earnshaw, Newark, N. J.

"Some Further Remarks on the Photometry of Gas;" by Mr. Chas. O. Bond, Philadelphia.

"Physical Theory of Coal Carbonization;" by Mr. W. H. Fulweiler, Philadelphia.

"Vertical Retorts;" by Mr. J. H. Taussig, Philadelphia.

"Relative Merits of Wrought Iron and Steel Pipe;" by Mr. Frank N. Speller, Pittsburgh.

"Report of Progress on 'A' Meters;" by Mr. W. J. Serrill, Philadelphia.

"Report of Progress on Dipping Meters;" by Mr. W. A. Castor, Philadelphia.

"Holder Cups and Tank Heating;" by Mr. C. J. Ramsburg, Philadelphia.

"Better Gas Illumination;" by Mr. Thomas J. Litle, Jr., Gloucester, N. J.

General Reports.

Report of the Public Relations Committee; Mr. E. G. Cowdery, Chicago, Chairman.

Report of Technical Committee; Mr. W. H. Gartley, Philadelphia, Chairman.

Report of Board of Revision of the Question Box on the Manufacture of Gas; Mr. J. D. Shattuck, Chester, Chairman.

Wrinkles; Mr. M. R. Bump, Editor, New York.

Accidents; Details by Members.

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Special Reports of the Sub-Committees of the Technical Committee.

Report of Committee on Calorimetry, Mr. R. B. Brown, Milwaukee, Chairman.

Report of Committee on Uniform System of Accounting, Mr. R. A. Carter, New York, Chairman.

Report of Committee on Pipe Standards, Mr. A. S. Miller, Baltimore, Chairman.

Report of Committee on Electrolysis, Mr. A. G. Glasgow, London, Chairman.

Report of Committee on Unit of Light, Mr. W. H. Gartley, Philadelphia, Chairman.

Report of Bureau of Information, Mr. W. A. Baehr, St. Louis, Chairman.

Report of Proceedings of International Committee for Standardization of Threads for Gas Appliances, Mr. A. G. Glasgow, London, Delegate.

Announcement.—Sight-seeing Trip to Consolidated Gas Company's Plant, by Mr. W. C. Morris, New York.

Note.—In order that the Proceedings containing the report of this meeting may be published and issued to the members immediately after the meeting, notice is hereby given that if any of the speakers at this meeting desire to correct their remarks before they are printed, they will be given an opportunity before leaving New York. The stenographer will have typewritten copy of the principal discussions prepared at the headquarters between the sessions of the meeting, and all those who desire to correct their remarks must notify the Secretary at the close of the session at which such remarks are made, as all reports will be turned in to the Publication Committee and thence to the printer immediately after the adjournment of the meeting.

Transportation.

Special rates for transportation have been granted (viz., full fare going and three-fifths fare returning by the same route) by the several Passenger Associations named and under the conditions noted.

The Trunk Line Association, covering the territory west of New England and east of and including Niagara Falls, Buffalo and Salamanca, N. Y.; Pittsburgh, Pa.; Bellaire, O.; Wheeling, Parkersburg and Charleston, W. Va.

The New England Passenger Association, covering nearly all of the lines in the New England States.

The Central Passenger Association, covering the territory bounded on the east, by Pittsburgh, Salamanca, Buffalo and Toronto; on the north, by Lakes Erie, Huron and Michigan to the north line of Cook county, Ills.; on the west, by the west line of Cock county and the Illinois and Mississippi rivers, to Cairo, including Burlington, Keokuk, Quincy, Hannibal and St. Louis; and on the south by the Ohio river, including points on either side of the river.

The Southeastern Passenger Association, covering the territory south and west of the Virginias, and south and east of the Ohio and Mississippi rivers, and the Western Passenger Association, covering the territory west of and not including Chicago, Peoria and St. Louis —in other words, the territory west of that of the Central Association —have refused to grant the rate, the former because of the small amount of travel to the meeting originating in its territory, and the latter because the fares to Chicago, Peoria and St. Louis from a large part of their territory are now on the basis of 2 cents per mile, so that members attending the meeting, who purchase tickets from the starting point to the nearest point in the territory of the Central Passenger Association and then buy tickets from that point to New York at the reduced fare, secure practically the same rates as far as the territory of the Western Association is concerned as would have been obtained under the old conditions with a rate of fare and one-third.

Members starting from territory in which the rates have not been granted should buy tickets from starting point to the nearest, or most convenient, point in the territory of any of the Associations granting the reduced rate, and at such point purchase tickets through to New York and obtain a certificate.

The following extracts from the regulations of the railroads are cited for the information of the members. The special rates are granted subject to these regulations:

1. The reduction is conditional on there being an attendance at the meeting of not less than 100 persons holding certificates, obtained from ticket agents at starting points, showing payment of full first-class fare of not less than 75 cents through to place of meeting.

2. Each person, to obtain the excursion rate, must purchase a first-class ticket (either limited or unlimited) to the place of meeting, for which he will pay regular fare, and upon request the ticket agent will issue a printed certificate of purchase of the standard form. Agents at all important stations are supplied with certificates. If, however, the ticket agent at a local station is not supplied with certificates and through tickets to place of meeting, he can inform the delegate of the nearest important station where they can be obtained. In such case the delegate should purchase a local ticket to such station and there secure certificate and through ticket to place of meeting.

3. If through tickets cannot be procured at the starting point, purchase short-trip ticket to the most convenient point where such through tickets can be obtained, and there purchase through to place of meeting, requesting a certificate from the ticket agent at the point where each purchase is made.

4. Tickets for the return journey will be sold by the ticket agent at the place of meeting at three-fifths the highest limited fare, only to those holding certificates signed by the ticket agent at point where through ticket to place of meeting was purchased, and countersigned by signature written in ink by the Assistant Secretary of the Association, certifying that the holder has been in regular attendance at the meeting.

5. No reduction of fare will be made on the return passage, if the going ticket is purchased more than three days before the opening date of the meeting; except that when meetings are held at distant points, to which the authorized limit is greater than three days, tickets may be purchased before the meeting in accordance with the limits shown in regular tariffs.

6. Certificates must be given to Mr. West Bissell, Assistant Secretary, at the New York headquarters, together with 25 cents for each certificate, this being the fee charged by the railroads for the services of their special agent. After the certificate has received the proper indorsement and the vise of the special agent it will be returned to you.

7. Certificates are not transferable, and return tickets secured upon certificates are not transferable. The transfer of any such is liable to prevent the securing of reduced rates for future meetings.

8. The certificate of agent at starting point, duly indorsed by the Assistant Secretary of the Association, must be presented to ticket agent at place of meeting within three days (Sunday not reckoned) after adjournment of meeting. The return ticket will be for the line or lines covered by the going ticket.

9. No refund of fare will be made on account of any person failing to obtain a certificate.

Entertainment and Hours of Meeting.

Wednesday, October 21.—The business sessions will be from 10 A.M. to 12:30 P.M., and from 2 P.M. to 5 P.M. The evening will be at the disposal of the members, no entertainment having been arranged for Wednesday.

Thursday, October 22.—Business session from 10 A.M. to 2 P.M. Remainder of afternoon at the disposal of members. Tickets of admission will be given to those who desire to visit the gas and electric stations in and around the city. The banquet for members and guests will be held at the Hotel Astor at 7 P.M. This hotel is noted for its excellent service, and it is the desire and expectation of the Committee to make this a most attractive feature, both as regards the quality of the dinner and the speaking afterward. Arrangements have been made for the ladies to attend the performance at the Hippodrome on Thursday evening, this entertainment being both unusual and interesting, in fact, the only one of its kind.

Friday, October 23.—Business session from 10 A.M. to 12:30 P.M. After adjournment members are invited to inspect the plant of the Astoria Light, Heat and Power Company. Luncheon will be served on the steamer while making the trip from Manhattan to Astoria. The return trip will be made in time for members to dine at their respective hotels. On this afternoon there will be an automobile trip around New York for the ladies, giving them an opportunity to see many points of interest. Friday evening will be at the disposal of the members.

Saturday, October 24.—The Committee has arranged an excursion to West Point for members and ladies. In addition to the other interesting features at West Point, there will be a dress parade of the cadets. Returning, the steamer will reach New York in time for dinner, enabling members to catch evening trains for home, if so desired.

Tickets for Entertainment.—Tickets for the banquet only will be $5 each. Tickets for banquet and West Point excursion will be $10 each. This ($10) charge will also include the entertainment of one lady at the Hippodrome, on the automobile trip and on the West Point excursion. For any additional ladies, a further charge may be expected.

Special Notes.

Please fill out the inclosed stamped and addressed postal card and mail *at once*. This will materially aid the Committee of Arrangements and prompt replies will be much appreciated.

Be sure to obtain a railroad certificate when buying your ticket to New York. The greater the number of certificates handed in, the easier it is to obtain the reduction in rates for future meetings, since the railroad officials count the certificates turned in as marking the full attendance. Apply for ticket and certificate at least 30 minutes before train time. Each person must sign his own certificate at time of purchasing tickets to New York. Members will please hand the Assistant Secretary their certificates, accompanied by 25 cents for each one, upon arrival at Headquarters. If there are 100 members present holding certificates, each certificate will then be promptly indorsed and held at the Institute Headquarters where members should call for them. Apply for return tickets at least 30 minutes before train time and have your certificates with you. All persons, ladies included, attending the meeting are entitled to the reduced rate from the territories named. Keep this circular in your pocket and apply to it if in doubt. Alex. C. Humphreys, President.

Extract from the Constitution.—Sec. 19. A member whose dues for a year completely expired are not paid, shall not be entitled to vote, nor to participate in the deliberations of the Institute, nor to receive a copy of the Proceedings. Any member whose dues shall remain unpaid for a term of 3 years may be dropped from the roll of membership by a vote of the Directors. A member dropped for nonpayment of dues may, upon paying the amount he owes the Institute, be reinstated at the option of the Directors.

[OFFICIAL NOTICE.]

Annual Meeting, Empire State Gas and Electric Association.

EMPIRE STATE GAS AND ELECTRIC ASSOCIATION,
OFFICE OF THE SECRETARY,
154 Nassau street, N. Y., September 1, 1908.

Gentlemen: The annual meeting of this Association will be held in the United Engineering Societies Building, 29 West 39th street, October 7, 1908. Among the subjects to be discussed are: "Public Policy Work of the Association." "Standards for Gas Service and Standards for Electric Service, Taking as a Basis the Recent Rules of the Railroad Commission of Wisconsin." "Taxation of Gas and Electric Companies in New York State with a Report from the Taxation Committee." "Insurance of Gas and Electric Stations." "Review of the Decisions of the Public Service Commissions." "Electric Meter Testing with Report of the Meter Committee." "Accounting, with Report of the Accounting Committee." "Amendments to the Constitution and By-laws with a New Schedule of Annual Dues." "Affiliation with the American Gas Institute and the National Electric Light Association."

All of the details of the programme have not been completed, but it is expected that the meeting will be exceptionally interesting.

Truly Yours, CHARLES H. B. CHAPIN, Secretary.

BRIEFLY TOLD.

THE KALAMAZOO MEETING OF THE MICHIGAN GAS ASSOCIATION.—The 17th annual meeting of the Michigan Gas Association was brought off according to programme on the appointed days the last week in September, and it proved, as it was known it would prove, a meeting that was fully up to every standard heretofore set by the Michigan gas men. The one thing to mar the convention in any sense was the prevailing haze which all too potently told of the ravages that were occurring in the woods' of Michigan and surrounding territory through forest fires of great violence. The technical programme was adhered to with faithfulness, and that the members were certainly on hand for business was shown in the excellent attendance during the hours set for the regular business order. Of course it is unnecessary to say that the officers and committees were completely up to the active and continued performances of their many and sometimes perplexing duties. The feature of President Frazier's logical and thoughtful address was his plea for publicity of their business ways and records by the lighting companies in their respective centers of trade. In fact, one might be forgiven for believing that President Frazier is far from being opposed to State Commissions. Secretary Ewing (and a right good Secretary he is) was amongst those who smiled softly when it become known that the membership list had been increased by the adding thereto of 25 names or so. The matter of working in harmony, and with the jurisdiction of the American Gas Institute, was set in satisfactory motion, although it was noted that a few were inclined to go it alone. The officers elected were:

President.—J. T. Lynn, Detroit.
Vice-President.—B. O. Tippy, Grand Rapids.
Secretary and Treasurer.—A. P. Ewing, Detroit.

The amusement and social side generally could not have been excelled for solidity, enjoyment and oddity. Perhaps it is best at this late day merely to note that the main features thereof were: Wednesday, an "informal dinner;" Thursday, helping "to assist in the opening" of the Majestic Theater, topped off with a "Smoker" in the Elks' Temple. Despite the heat, and the unfortunately potent natural smoke from the raging forest fires, the member had plenty of action to keep them not only awake but busy—for further particulars in these regards Toastmaster Eaton, the "big man" (in every sense, manner and way) Lynn, and the comical Brownell may be appealed to. The business sessions were closed the morning of the 24th, after which a delightful trip to and over Gull Lake brought to a close a most successful meeting.

CURRENT MENTION:—

COMPLETING our mention of a fortnight ago regarding the Santa Cruz (or 16th) annual meeting of the Pacific Coast Gas Association, we may note that the officers elected were: President, George A. Colquhoun, San Francisco; Vice-President, Wm. F. Boardman, San Francisco; Secretary and Treasurer, John A. Britton, San Francisco; Asst. Sec. and Treas., Henry Bostwick; Directors, Wm. Baurhyte, E. H. Hall, Frank Leach and C. F. Stamps. The membership list was increased by 22. A local paper, in reporting the banquet doings, said: "It was most elaborate and expensive. In fact, finer could not have been served."

MR. HERBERT A. GIDNEY has been appointed Assistant Treasurer of the Tenney syndicate, which operates gas and electric lighting companies at several points in Massachusetts. His headquarters are in the main offices, 184 State street, Boston.

MR. MALCOLM S. GREENOUGH will arrive home some time this month, after a protracted European tour.

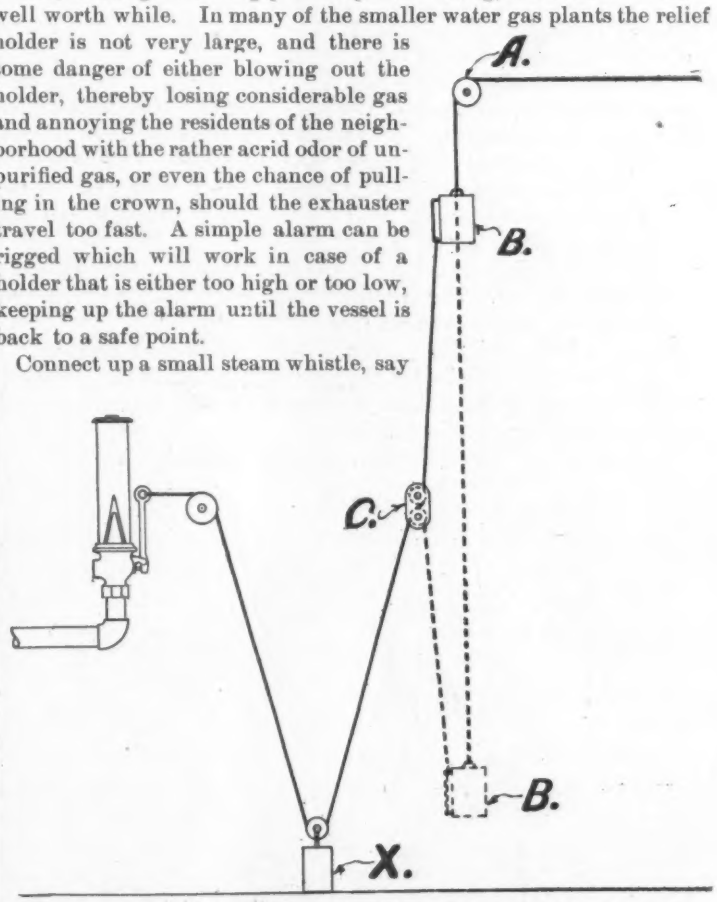
THE 2-day convention of those connected with the lighting properties of the Child-Hulswit Company was held in Grand Rapids, Mich., the Monday and Tuesday preceding the convention of the Michigan in Kalamazoo. In fact, those having attended it were conveyed by special car in time to take part in the Michigan convention the following Wednesday. The meeting was an undoubted success, and there certainly was an excellent presentation and discussion of a valuable mass of technical matter; and not the least therein was the paper by Mr. Frank T. Hulswit, on "The Financial Problems of the Manager." The dinner at the "Peninsular Club," the evening of Sept. 21st, was perhaps the most notable of the social features, a goodly number of which had been arranged for.

Relief Holder Alarm.

[Prepared for the JOURNAL, by MR. R. V. HOWES.]

This, although seemingly a very little thing, nevertheless seems well worth while. In many of the smaller water gas plants the relief holder is not very large, and there is some danger of either blowing out the holder, thereby losing considerable gas and annoying the residents of the neighborhood with the rather acrid odor of unpurified gas, or even the chance of pulling in the crown, should the exhauster travel too fast. A simple alarm can be rigged which will work in case of a holder that is either too high or too low, keeping up the alarm until the vessel is back to a safe point.

Connect up a small steam whistle, say



⅜-inch size; run a line, sash cord being the most satisfactory, from the boiler over a pulley fastened to the top girder, then over a pulley, *A*, fastened against the wall above the whistle, and thence to a weight sufficiently heavy to keep the cord always taut. From the weight run another line through a pulley, at a point just half the height of the holder, thence through a pulley fastened through a smaller weight than the main weight, the smaller weight resting on the floor. Then the cord is carried so as to pull the spring valve which comes with the whistle. The object of the weight, *X*, is to prevent the pull of the holder from tearing the whistle from the wall. One can readily see that if the holder goes up too high the weight, *B*, goes down the wall, and if it should go to a point nearing the blowing-off stage, the secondary rope, pulling over pulley, *C*, would pull up the weight, *X*, and pull sufficiently hard on whistle to cause it to blow. Should the holder go down, the weight, *B*, would go up the wall and would pull the secondary cord straight up through *C* and pull the whistle. The whistle is surer than a bell rung by a battery, as a gas plant always has steam when the exhauster is moving; again, the whistle can be heard further.

Annual Report, Bureau of Lamps and Lighting, New York City, for the Year 1906.

Rather late it looks; but better late than never, perhaps. The annual report for the year 1906 of the Department of Water Supply, Gas and Electricity, which is under the supervision of Hon. Frank M. O'Brien, has been published at last, and one-third of the volume (182 pages) is devoted to the report of Mr. C. F. Lacombe, Chief Engineer of Light and Power. This report covers the operations of the city regarding the lighting of streets and public buildings, and some idea of the magnitude of the work may be gained from the statement that the street lamps number over 65,000, and there are over 1,500 public buildings with lamps numbering hundreds of thousands, and the total expenses of the Bureau amount to over $3,000,000 per year. Further, this report is the first comprehensive statement as to public lighting given since consolidation.

The portion of the report which will interest gas men the most is the statement prepared by one of the best known, and we may say,

best liked, men in the profession, Dr. E. G. Love, Chief Gas Examiner for the city.

The work under his direction has largely increased during recent years, and he now has charge of all testing stations for the candle power, pressure and quality of gas supplied throughout the greater city. During the year 1906, six new stations were opened in addition to the two which have been in operation since 1877. Before the end of the year 16 separate gas supplies were tested daily, and the results as a whole redound to the credit of the companies. The average candle power ranged from 22.12 to 25.01, and there were only 108 violations of the 22-candle power standard. Of these only 23 were charged up against the Consolidated Gas Company.

The pressures carried show that the companies have endeavored to comply with the provisions of the law, and those in Manhattan have been notably successful, the average maximum pressure only exceeding the legal limit of 2½ inches in one instance. In Brooklyn the average maximum was below this figure in two cases, and above in four cases, while the reports from Queens and Richmond both show maximum pressures higher than 2½ inches.

The tests for sulphur, ammonia and sulphuretted hydrogen are all that may be desired. The average specific gravity of the several gases distributed for the year ranged from .567 to .662.

Comparatively few of the accounts with the various lighting companies have been settled since the year 1903, owing to the question of price, but those that have show considerable reductions from the prices bid, especially for electric lighting.

The expenses of the department are shown in Table I.

TABLE I.

Department Expenses, Bureau of Lamps and Lighting, 1906.

Street lighting	$2,474,819.55
Public buildings	556,344.04
Heat and power	44,376.48
Bureau expenses	30,562.51
Salaries	95,355.36
Testing electric meters	500.00
Total	$3,201,957.94

The first item covers the entire cost of lighting and repairs of the street lamps, which numbered 65,499 on January, 1907, as against 64,941 January 1, 1906. Aside from the increase of 558 lamps, nearly 1,500 of the arc lamps were changed from 325 to 450-watt, and nearly 9,000 gas lamps were changed from open flame to mantle, and a similar improvement was made on 2,000 naphtha lamps. The figures given are not reprinted in detail, as a statement showing the number in use on January 1, 1908, was published in the JOURNAL for July 6th last.

The report gives a very complete statement of the various bills presented for payment, and an interesting feature is the item termed "Outage deductions," which amounts to several thousand dollars per year.

The repairs to gas lamp posts and the expense of same are given for the Boroughs of Manhattan and the Bronx and the totals are as follows: 4,015 repairs, cost $14,623; the average cost of repairs per lamp, there, being 22,743, burning throughout the year was $.64296, and to this must be added the cost of painting, which was 20 cents in Manhattan and 25 cents in the Bronx. The electric lamps belong to the companies and the repairs are included in the price charged for current.

The mileage of streets lighted is given in Table II.

TABLE II.—*Showing Mileage of Streets Lighted in Manhattan and the Bronx, December* 31, 1906.

Arc.		Incandescent.		Gas.		Naphtha.	
Miles.	Feet.	Miles.	Feet.	Miles.	Feet.	Miles.	Feet.
309	3,819	10	4,640	394	4,924	52	1,226

Total 767.5 miles.

In that portion of the report covering public buildings we find that the total amount of electricity used for lighting came to 3,548,490.6 kilowatt hours, and the gas used amounted to 340,911,400 cubic feet. This gas was used in 1,500 buildings and exceeded the sales of the Flatbush Gas Company, which has over 10,000 consumers.

The gas used in the public street lamps amounted to nearly 577,000,000 cubic feet, so that if this be added to that used in public buildings, the total will be over 915,000,000 cubic feet. This latter figure is 50 million greater than the figures of the Rochester (N. Y.) Railway and Light Company, which has over 36,000 meters in use.

The High Pressure System of the Los Angeles Gas and Electric Company.

[Prepared for the Santa Cruz (Cal.) Convention of the Pacific Coast Gas Association, by MR. C. A. LUCKENBACH.]

In 1901 the Los Angeles Lighting Company, the predecessor of the Los Angeles Gas and Electric Company, commenced the installation of a high pressure system, which it was intended should be used both for feeding the then existing low pressure system and also as a direct high pressure distributing system. At that time the phenomenal growth of Los Angeles had but fairly commenced, and it was hardly dreamed that, in a few short years, the inhabited territory would almost double and the outlying districts build up to such an extent as to demand the large additions which have since become necessary.

At that time two high pressure lines were installed, each with its own compressor, located at different points in the city. The one was installed for the double purpose of acting as a feeder for the low pressure system, and also for direct distribution, and was supplied through a duplex, single-stage, belt-driven compressor having a piston displacement of 50,000 cubic feet per hour, and capable of working against a pressure of 60 pounds. The other was installed for the purpose of feeding the pressure in the east Los Angeles district only, and was supplied through a straight line, belt-driven compressor, having a piston displacement of 19,260 cubic feet per hour, and capable of working against a pressure of 60 pounds.

The unprecedented increase in building and the rapid extension of the residence territory demanded material extensions in the system, and in 1903—less than 1½ years after the first installation—it was decided to erect a compressor station, install larger apparatus, and handle all of the compressed gas from one point. This was completed and put in operation in the fall of 1903. At that time the system consisted of 21½ miles of pipe, of which 12 miles was 6-inch main line, and 15½ miles 2-inch laterals, all inside the city of Los Angeles.

Up to that time the primary object in view was the using of the compressed gas for feeding the pressures of the low pressure system, and at that date the direct high pressure distributing system may really be said to have commenced. Twelve miles of 2-inch mains, which had heretofore been low pressure mains, were made high pressure lines; extensions were rapidly made beyond the city of Los Angeles, and the system extended to South Pasadena, Alhambra and Dolgeville, and a 6-inch service extension of 4,800 feet, for the purpose of furnishing gas to the Pasadena Consolidated Gas Company, was run.

In 1905 the construction of a third line, for the purpose of supplying the northwest portion of Los Angeles City, East Hollywood and Hollywood City, was completed, and in 1907 the feeder lines of East Los Angeles were connected with the high pressure system; the four lines, on August 1st, 1908, comprising 128 miles of feeders and laterals under high pressure.

COMPRESSOR STATION.

Location.—The compressor station is located approximately 1,000 feet from the generating plant of the Company, and within a few feet of two 1,000,000 cubic feet storage holders.

Buildings.—The boiler room is a brick, steel and galvanized iron, fireproof building, 42 feet by 38 feet, by 32 feet high, and so arranged that housing for an additional boiler can be provided without interfering with the present structure.

The main compressor room is a brick, steel and galvanized iron, fireproof building, 28 feet 6 inches wide, by 82 feet long, by 19 feet high, and so constructed that a duplicate of the present large compressor may be installed and the proper housing provided without interfering with or requiring any change in the present structure. The building for the auxiliary compressors is 50 feet by 125 feet by 19 feet high, built of frame and galvanized iron.

The two compressor buildings are connected by a covered steel and galvanized iron passageway, providing ready communication and allowing the operators in either building full and unobstructed view of the interior of the other.

Boilers.—Steam is furnished from two 500-horse power (builders' rating) Stirling water tube boilers, each having 2,020 square feet of heating surface and 98.85 square feet of grate surface, and built for a working pressure of 150 pounds. Each boiler has its individual stack, 60 inches in diameter and 100 feet in height above the floor level. The boilers are equipped for burning either oil or carbon, and are installed with the idea of adding an additional boiler when the service requires it.

Compressors.—Four compressors have been installed, having a total capacity of 908,000 cubic feet per hour, all built for operating against a pressure of 60 pounds. The machines in the order of their importance are: One 24 and 42 by 34 by 60 Corliss cross-compound, duplex compressor, with Cincinnati valve gear on compressor end, having 4 inlet valves on each compressor cylinder and spherical seated bearings on crankshaft. The steam and gas cylinders are arranged tandem, the steam cylinders being next to the frame. The machine is provided with an automatic governor, controlling speed and pressure by action upon the cut-off. The opening and closing of the suction and closing of the discharge are controlled by means of valves mechanically operated from eccentrics on the main crankshaft, and the discharge opening is controlled by steel poppet valves, working on bronze seats. The frame is of the heavy, rolling-mill type, the main pillow block being cast as part of the bed. The slides are of the bored type and heavily ribbed. The flywheel is 18 feet in diameter and the total weight of the machine is 300,000 pounds. The diameters of the openings are as follows: Steam pipe, 8 inches; exhaust pipe, 14 inches; gas suction, 16 inches; gas discharge, 14 inches. The capacity is 553,000 cubic feet per hour.

One belt-driven, horizontal, duplex compressor, having 25-inch by 24-inch cylinders. The machine weighs 48,000 pounds and has a capacity of 150,000 cubic feet per hour. The motive power of this machine is a 350-horse power, 500-volt, compound-wound, direct-current motor.

One belt-driven, horizontal, duplex compressor, having 22-inch by 30-inch cylinders. The machine weighs 46,700 pounds and has a capacity of 148,000 cubic feet per hour. The motive power of this machine is a 350-horse power, 500-volt, compound-wound, direct-current motor.

One belt-driven, horizontal, duplex compressor, having 16-inch by 18-inch cylinders. The machine weighs 13,600 pounds and has a capacity of 57,000 cubic feet per hour. The motive power is a 125-horse power, tandem, compound engine. The three latter machines are provided with positive moved suction valves of the Corliss type and discharge valves of the regular poppet type, automatic in action.

Pumps.—Feed water is supplied by duplicate 10 by 6 by 10 duplex, brass-lined pumps, and oil by duplicate 6 by 4 by 6 duplex, brass-lined pumps, while boiler compound is supplied by a 3 by 2 by 4 duplex pump.

Fuel Supply.—Two fuel oil tanks, each of 280 barrels capacity, are connected with the main storage tank at the generating plant and are so arranged that they are filled by gravity; or, in case of necessity, by pumping, while the oil is heated by exhaust steam in a heater 42 inches in diameter by 16 feet long.

Water Supply.—Feed water is supplied from the city mains, and a water tank, 6 feet in diameter by 15 feet high, is connected for an emergency, the water being heated by exhaust steam in a heater, 5 feet in diameter by 15 feet 6 inches long.

Piping.—All steam piping is of extra heavy pipe, with the best of fittings.

Gas piping is of wrought iron and steel riveted pipe with long sweep fittings, and all piping below the floor level is in trenches covered with iron plates, so that any portion is accessible at a moment's notice.

Suction is obtained through two 16-inch, steel-riveted pipes, from two 3-lift gasholders, each 125 feet 6 inches in diameter and 123 feet high, and each containing, when full, 1,016,820 cubic feet of gas, and having a pressure on the third lift of 11 inches. These suctions are so arranged that gas may be taken from either or both holders at the same time, and so that the main and auxiliary plants may draw from either holder independently at the same time.

On the discharge, between the compressors and the distributing board, a compression tank, 5 feet in diameter by 11 feet 3 inches in length, is located for taking care of any sudden fall in pressure. The discharge from all the compressors leads to a common point or distributing board at the inlet of the feeder mains, where, by valves, the requisite amount of gas to maintain the necessary pressure in the respective lines is released. The auxiliary compressors are also connected so that any one of them can discharge into any one of the feeder lines while the others are discharging into the main header.

Distributing System.

With the exception of a comparatively small portion, all of the mains and laterals of the system are genuine, wrought iron, screw pipe. For a distance of approximately a mile from the compressor station-lead expansion joints are placed at approximately every 500 feet and similar joints are placed at each end of all bridges and trestles carrying pipe. At the off-take of each lateral a gate valve or stopcock is placed, as well as at each end of all bridges and trestles crossed by the mains. Wherever a service is taken off, a pipe clamp with lead gasket is used, and stopcocks are placed in the service just after leaving the main and just before reaching the meter. Each service has its individual regulator set for 4 inches outlet pressure, and all meters are iron. All pipe is painted with water gas tar, the tar being applied to the steam heated pipe with a brush. Four separate and distinct feeders convey gas to the respective districts and to the feeders of the low pressure districts as follows:

Line No. 1, to high pressure district No. 1, and low pressure feeders of the southwestern portion of the city.

This district, lying at the southeast corner of the city of Los Angeles, is 3.2 miles long and 1.8 miles wide, with an approximate area of 5¼ square miles, and the nearest point is 2½ miles from the compressor station. The main feeder line, slightly over 5 miles long, is made up of 12, 10 and 6-inch pipe. At the end of the 12-inch section a connection is made with the 30-inch inlet of the main storage holder of the Company, the holder being filled from this line. It may be of interest at this point to note that this holder is one of 5 lifts, 195 feet in diameter and 226 feet high, with steel tank, and has a capacity of 5,016,000 cubic feet. The pressure when on the fifth lift is 13.4 inches.

At the end of the 10-inch section, or approximately 2 miles from the compressor station, a 6-inch feeder line for the low pressure system is taken off. This line runs westerly and southerly a distance of 4½ miles, where it connects with another similar feeder line. Additional feeder lines are taken off at several points, the extreme point of the longest feeder being 8 miles from the compressor station. At 7 different points along the feeder lines district governors are located, the same being set for pressures varying from 8 to 15 inches.

The total lines supplied by Pipe Line No. 1 are 43 miles 895 feet in length, of which amount 34 miles 895 feet are within District No. 1, and 9 miles are feeders for low pressure mains.

There are 3,500 meters in the district, and the output will closely approximate 9,000,000 cubic feet per month.

Line No. 2 to High Pressure District No. 2.—This district comprises the northeastern portion of the city of Los Angeles, and South Pasadena, Alhambra and Dolgeville, covering a territory, irregular in shape, with an approximate area of 8½ square miles, the nearest point being 3 miles from the compressor station.

The main feeder is 11 miles 1,720 feet long and is made up of 10, 6, and 4-inch pipe. At three different points 4 and 6-inch laterals are taken off from the main line, one of these being approximately 2 miles long, through which gas is supplied to the Pasadena Consolidated Gas Company. The total pipe lines in this district measure 54 miles 1,141 feet. There are 3,600 meters in the district and the output will closely approximate 9,750,000 cubic feet per month.

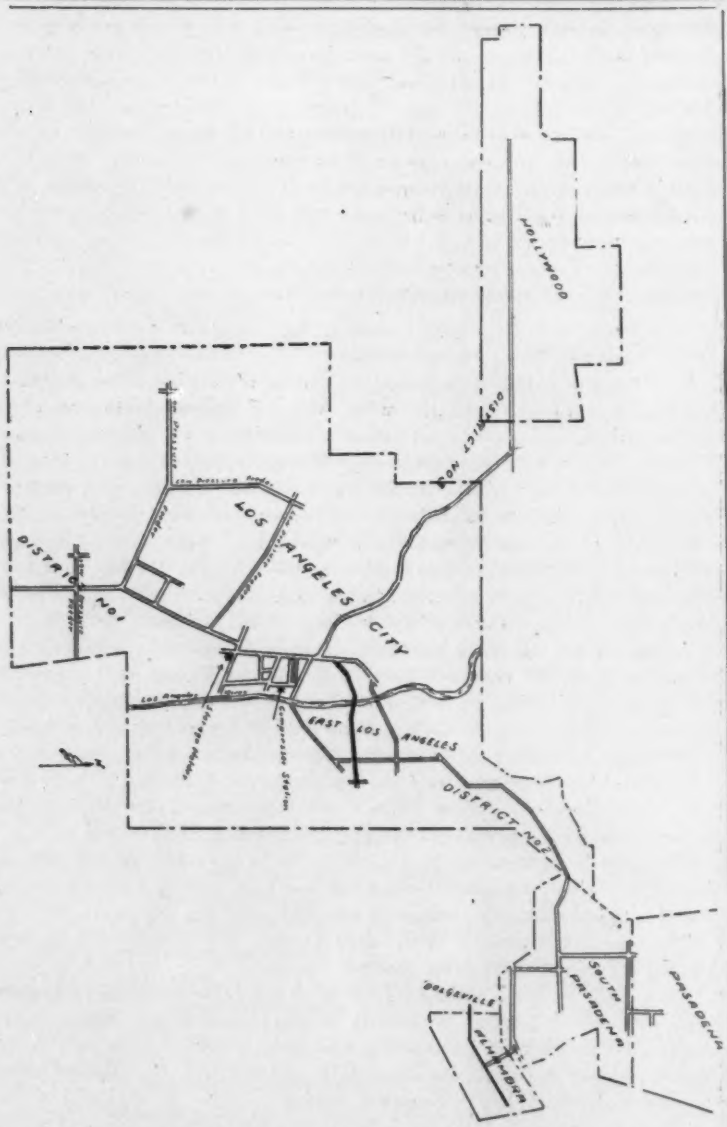
Line No. 3 to High Pressure District No. 3.—This district comprises the northwestern portion of the city of Los Angeles, East Hollywood and Hollywood, covering a territory with an approximate area of 3 square miles, the nearest point supplied being 1 mile, 3,820 feet from the compressor station. The main feeder line is 8 miles 1,845 feet long and is made up of 8 and 6-inch pipe.

The total pipe lines in this district measure 26 miles 1,165 feet. There are 850 meters in the district, and the output will closely approximate 3,100,000 cubic feet per month.

Line No. 4 to Feeders for East Los Angeles Low Pressure District.—This feeder line feeds the low pressure distributing mains of the East Los Angeles district. A single line leads from the compressor station, a distance of 4,600 feet, when it divides into 2 mains, one 8,700 feet long, the other extending 5,800 feet from the dividing point. The total line under high pressure is 3 miles 3,260 feet, and is made up of 8, 6 and 4-inch pipe. At six different points along these lines district governors are located, the same being set for outlet pressures of 10 to 15 inches.

Pressure.—The maximum pressure carried on the compressors is 45 pounds which, by this method of distribution, is, of course, the maximum pressure required for any district. This pressure is required, however, only on Line No. 1, at the evening peak during the winter months, and with this pressure at the compressor a minimum pressure of 10 pounds is maintained within the district.

During the time of filling the Pasadena holder a pressure of 40 pounds is maintained at the compressor which, with the valve wide open, gives a pressure of 1 pound at the inlet of the governor before the station meters. At the present time of year the maximum pres-



sure is never above 27½ pounds for Line No. 1; 10 pounds for Line No. 2; 4 pounds for Line No. 3; and 10 pounds for Line No. 4; which pressures permit of ample leeway for any sudden off-take.

With the piping arranged so that the compressors can be operated separately, or in parallel, on any of the four lines, ample capacity is available for maintaining the required pressures with even a very great increase over the present peak consumption, and to date absolutely no trouble of any kind has been experienced in giving a satisfactory service on all parts of the system.

Cost of Compression.—Careful figures as to the cost of compression, based upon actual operating periods and conditions, show the same, including operating and fixed charges, to be slightly less than 1¾ cents per 1,000 cubic feet.

The Story of Carbon in Oil Gas Manufacture.

[Prepared for the Santa Cruz (Cal.) Convention of the Pacific Coast Gas Association, by MR. F. C. MILLARD.]

Owing to the extent of the manufacture and consumption of oil gas on the Pacific Slope, particularly in California, the question of carbon or lampblack is one of importance. We shall use the term "carbon" in speaking of what a great many people call "lampblack." Carbon, strictly speaking, is a coked oil of a very fine nature, and is the principal by-product in the manufacture of oil gas. The quality of carbon is governed to a large extent by the grade of oil used and the candle power maintained in the gas, the amount of dead oils in the carbon varying only from 6 or 7 per cent. up to 20 per cent., where the candle power of the gas is maintained at a higher level.

The carbon is removed from the gas while it passes through the washbox, after leaving the generator. This washbox, containing a metal diaphragm and partially filled with water, separates the carbon from the gas as it passes through the water and around and against the diaphragm. From the washbox the carbon is carried with the overflow water to a small seal-pot where it is observed by the operator and retained long enough for him to determine the candle power of the gas being made. A competent operator is enabled to determine the quality of the gas within one half a candle by this observation at the seal-pot. He is also enabled to closely estimate the amount of water being used in the washbox. From the seal-pot the carbon is carried through a drain pipe, in large plants, to a collection pot, where the carbon from all the generating sets is deposited before finally being carried to the settling pits.

A carbon settling pit consists of a large excavation with an ordinary flume drain, with irrigating ditch gates, as an inlet for water and carbon, and a similar flume as an outlet for water. In this pit, at the mouth of the outlet flume, is arranged a complete set of baffling apparatus or trays, placed in a vertical position. The object of this is twofold: To handle or retard the flow of water to the greatest possible extent; secondly, to act as a skimmer and hold the carbon in the pit. The larger the pit area the better the results, as our experience shows that settling pits, to obtain the best results, must contain a large area, but, on the other hand, must be shallow. The water and carbon in these settling pits should be as nearly motionless as possible. In large plants the best results can be obtained by a system of pits, 3 in number, the first of which receives the carbon and water, the second is drying out while the third is dried and is being emptied. The water, as it leaves the pit that is being filled, can be conserved and pumped over a cooler and used as many times as desired. This is advantageous in localities where water is not plentiful.

From the settling pits the carbon may be taken, by means of either teams or mechanical conveyances, and placed on a final drying ground; or, in places where plenty of space is available for sun drying, it may be pumped from one pit as fast as settled. By so doing the necessity of a system of settling pits is obviated, only one pit being required to conserve the water. The carbon having arrived on the final drying ground is in a position to be dried by the action of the atmosphere. This natural drying process is usually assisted by hauling a heavy roller over the pile of carbon; this forces the moisture from the pile to the surface, where the sun and wind cause it to be rapidly evaporated. The rolling process also leaves the carbon in more solid, compact form, so that it may be used for smokeless boiler fuel or water gas generator fuel without pressing or bricking. When weather conditions will not permit of sun drying, the carbon may be artificially dried by a mechanical dryer.

The carbon may be carried by means of teams or mechanical conveyors, to a briquette press, to be made into a domestic fuel, or to a brick machine making fuel brick the size of an ordinary building brick. In the latter form it is very desirable as a fuel, but costs little more than in lump form. When containing between 20 and 30 per cent. of moisture at the time of pressing, and with no other binder, carbon produces a briquette or brick which, when properly made and cured, is a solid fuel the superior to which is not to be found on the Pacific Coast. It makes a splendid grate, cook stove, base burner or boiler fuel. The objection might be raised that this fuel, without any binder, would not stand shipment. We find by trial that a briquette pressed from carbon containing no binder, but about 20 to 30 per cent. of water, and then well dried, will stand a great deal of handling.

The manufacture of the carbon into briquettes is done by means of an ordinary pressed brick machine, having mold and dies of a cylindrical form. The most satisfactory size that we have found is 2½ inches in diameter by 2½ inches deep. Some prefer the same size of briquette with a conical top, but there is little difference. The ordinary pressed brick machine, with mold and dies of cylindrical form making, say, 12 briquettes to the revolution, turns out a good article at a very reasonable figure. Those in authority recommend them as a good fuel, evaporating as many pounds of water to the pound of fuel as does soft coal. It is safe to use these briquettes in a city with a stringent smoke ordinance, for with very little care they may be burned in small boiler plants with no smoke.

When manufactured in the form of bricks, carbon is particularly adapted for large furnaces in residences, for large boilers, and as a gererator fuel for water gas. An ordinary pressed brick machine, with mold and dies making bricks 9 inches by 4 inches, by 2½ inches is used, with no binder other than the 20 to 30 per cent. of moisture contained in the carbon at the time of pressing. After these bricks are cured they make a better fuel for the purposes mentioned than the briquettes.

There is still another type of press which, for making fuel for use around the gas works—either in water gas generators or under boilers—is the best adapted of all. It is a machine of a plunger type, that

is capable of subjecting the material to an enormous pressure and turning out a brick by what might be termed a "continuous" process. The brick, as we use it, is about 3 inches square and has no regular length, as it would require still another piece of apparatus to make the bricks in regular lengths. By using a trough at the outlet of the plunger die, leading from here to any point desired, or where the product is to be used, the bricks will break off in uneven lengths by falling over the end of the trough. With the machine in use by us, these pieces furnish, practically, 3-inch cubes. The dies of the machine may be made of any size, of course, but we find the above mentioned die gives the best results.

Carbon, when mixed with 40 per cent. of pitch or tar, is a valuable smudge fuel for frost protection in the orange belt, making not only a dense smoke, on account of the added tar or pitch, but a good heat as well, and it is a slow-burning fuel. To illustrate the slow-burning qualities of carbon it is necessary only to fill a grate with briquettes, and after the fire is well started add a few more. The briquettes will burn for 3 or 4 hours, holding their perfect shape during all of this time, and not until they are completely burned out will they lose it. When entirely consumed they will suddenly break up into a powder, leaving a very small percentage of clean ash. The ash in carbon is very slight, being from 1 to 6 per cent. This is true of carbon fuel in any of its different forms.

In closing I might say that this is merely a word sketch, telling the story as briefly as possible, hoping that it may be of benefit to some who are still struggling with the question. We do not claim, by any means, to have settled the problem of handling the product. The above is given simply as the result of many trials and experiments, disappointments and successes, during the past 5 years.

Gas Furnace for Melting Soft Metals.

The United States Gas Furnace Company is putting on the market a new type of melting furnace, for the rapid softening of lead, zinc, type metal, babbitt, tin, aluminum and kindred metals, which is here illustrated. The design of the burner is such that the gas flame is directed over the complete surface of the pot, and the system is so simple that economy in melting time runs cannot be gainsaid. As the furnace is not lined, the only thing needed in connection with its efficiency is a new pot, and the infrequency of such renewals means low cost over long life. The apparatus is on sale in 4 sizes:

	Size of Pot, Inches.	Melting Efficiency, Pounds.	Gas Used, Cu. Ft.
No. 1..	6½ x 8	100	25
" 2..	7 x 10	150	30
" 3..	8 x 12	250	40
" 4..	16 x 12	500	70

This apparatus has been well tried out, and it can be counted on to do the work named above without failure, either in weight of metal or quantity of fuel used. Of course, the makers are ready to manufacture to order other sizes, but those named are considered about right for the present market.

Gas Engine Failures.[1]

We have again before us the annual report of Mr. Michael Longridge, M.A., M.Inst.C.E., the Chief Engineer of the British Engine, Boiler and Electrical Insurance Company, Limited. There is never any lack of material for this report, which is not surprising when the great operations of the Company are considered, and the immense value of the steam, gas, oil and electrical plants that are under their care as insurers and survey for their own protection. The first point that strikes one in the report is that gas and oil engines stand well among the power competitors for reliability. Among the steam engines for which the Company are responsible the rate of breakdown in 1907 was 1 in 11.7, among gas and oil engines 1 in 11.1, and among electric motors 1 in 7.9. This is for the gas industry an exceedingly satisfactory testimony from the point of view of relative mechanical reliability.

There is interest in the tables that give the proportions in which the various parts of the insured engines that broke down caused or initiated the breakdowns. The compilation for steam engines we pass over and only reproduce those for gas and oil engines and electric motors.

Gas and Oil Engines.

Description of Parts which are Believed to have Given Way First.	Average Previous to 1906. Per Cent.	During 1906. Per Cent.	During 1907. Per Cent.
Valves and valve gear	32.5	28.7	43.3
Cylinders and cylinder ends	16.6	16.7	13.5
Pistons	11.7	6.5	2.7
Connecting rods and their bolts	11.2	12.0	8.1
Main shafts	5.0	15.7	4.7
Governors and governor gear	4.4	7.4	7.4
Silencing boxes and exhaust pipes	4.4	2.8	1.4
Flywheels and driving drums	4.3	4.6	4.7
Clutches and couplings	3.5	....	...
Frames and pedestals	2.8	....	4.0
Bolts*	2.6	0.9	1.4
Total wrecks, cause not ascertained	1.0	1.9	. ..
Main driving ropes or belts	....	1.9	....
Miscellaneous	....	....	5.4
Gas producer plants	....	0.9	3.4
	100.0	100.0	100.0

* These do not include bolts in pistons, connecting rods, valve gear and other moving parts; the bolts in these parts being included with the parts themselves.

Electric Motors.

Description of Part Which is Believed to have Failed First.	Motors. 1906. Per Cent.	Motors. 1907. Per Cent.
Armatures and rotors	44	38
Magnet coils and stators	14	14
Commutators and brush gear	28	30
Miscellaneous	14	18
	100	100

Starting Switches and Controllers.	Motors. 1906. Per Cent	Motors. 1907. Per Cent.
Resistance coils	48	60
Contacts and switch arms	10	8
Automatic apparatus	17	13
Miscellaneous	25	19
	100	100

The causes of these breakdowns were probably as follows:

	Motors 1906. Per Cent.	Motors 1907. Per Cent.	Starters 1906. Per Cent.	Starters 1907. Per Cent.
Accidental	9	4	22	9
Dirt and neglect	19	28	11	16
Age and deterioration	25	23	23	27
Bad work or design	18	18	9	8
Overloading	2	1	7	5
Unascertained	27	26	28	35
	100	100	100	100

The causes of these breakdowns may be roughly classified as under:

	Gas Engines, per Cent.
Accident or causes unascertained	44
Old defects or deterioration by wear and tear	17
Weakness, bad design, workmanship or material	18
Negligence of owners or attendants	21
	100

The first table suggests a few remarks. The increase in the breakages of valves and valve gears is not satisfactory and demands the serious attention of makers of gas and oil engines. If all side shafts were fitted with ring lubricators and levers made of wrought iron or good cast steel, the percentage in the table would be reduced. The reduction in broken cylinders and pistons is encouraging and marks the progress which is being made. Connecting rods proved less destructive than usual, probably because of improvement in design, particu-

1. *Journal of Gas Lighting.*

larly as regards strength of bolts. The breakages of crankshafts, too, were notably fewer than in 1906.

Examples of the breakdowns of gas engines convey their own lessons. There is one illustration in which 5 horizontal gas engines were concerned, supplied with town gas. These engines had cylinders varying from 7¼ inches diameter by 14-inch stroke to 7¼ inches diameter by 13-inch stroke, running at about 200 revolutions per minute. All 5 were situated in one works. One evening in January the driver was called away as he was stopping the engines, and, in hurrying to obey the summons, forgot, or to save time, neglected to open the jacket drains. On returning the following morning he found 4 of the 5 cylinder jackets cracked from end to end and full of ice. Mishaps of this kind occur every winter, generally during the Christmas or New Year holidays or on Sundays, even among insured engines, whose owners are warned both when the insurance is effected and on the approach of cold weather every year. The advice given is to fix a stopcock on both the supply and return water pipes close to the cooling tank, and a drain cock at the lowest point of the return pipe, so that not only the jacket but the pipes leading to and from it may be emptied. To empty the jacket only is not sufficient, for if the pipes between it and the cooling tanks be frozen, the water supply will be cut off and the cylinder damaged or cracked by excessive temperature. When owners refuse to fit drains and stopcocks, gas jets under the cylinders are advised, but these do not always prevent freezing. In one case last winter the jacket of a cylinder, 5¼ inches diameter by 12-inch stroke, was found one morning cracked by frost, although a gas jet was burning under it, and so close to it as to cover the surface with soot. The heat from the jet had been insufficient to keep the water in the jacket liquid.

An unusual incident is brought before us in the case of a horizontal gas engine, 11 years old, with cylinder 8 inches in diameter by 15-inch stroke, running at 150 revolutions per minute. Town gas was used. The connecting rod was of forged steel, tapering from 1¼-inch to 1¼-inch diameter. The big end was of the marine type with two ¾-inch bolts. The eye at the small end, instead of being solid, was divided vertically; the half furthest from the crank forming a cap, which was secured by two ¾-inch bolts. One of these bolts broke at the bottom of the thread while the engine was running at the ordinary speed. Breakage of the other followed, and the rod, liberated from the piston, smashed the latter, knocked a hole through the bedplate, and was itself snapped close to the palm at the big end, and close to the eye at the little end. The crank pin brasses were also damaged, and the big end bolts bent. The unusual incident to which the breakdown owes its mention was the fracture of the rod in two places. The breaks were quite clean, without any signs of bending or stretching—just as if the rod had been made of very brittle cast iron. The inertia stress upon the two ¾-inch bolts was about 740 pounds, or about 3,070 pounds per square inch of sectional area at the bottom of the threads.

Interesting is the experience recounted regarding a horizontal gas engine, 3 years old, with cylinder 10 inches diameter by 21-inch stroke, with speed of 234 revolutions per minute. The engine was fired with town gas, and drove a 4-pole dynamo by a belt. The big end of the connecting rod was of the marine type, with two bolts ¾-inch diameter, and nuts secured by a locking plate. About half an hour after starting for an afternoon run, the nut seems to have come off the top bolt, for it was not found after the breakdown. The other bolt was stretched and broken; the brasses were also broken and scattered about the engine room. The connecting rod was bent and a piece broken out of the front end of the piston. The driver was absent when the breakdown occurred; but he declared positively that there had been no knocking either during the morning or when he started the engine after dinner. The story seems to be almost incredible. How did the nut get free from the locking plate? How did it screw itself entirely off the bolt? How did the remaining bolt hold the cap on while the delinquent nut was screwing itself off? The only other alternatives are that the nut burst spontaneously and flew off, or that the man had taken the nut off and started the engine without replacing it. The reader must choose for himself which tale he will believe. Mr. Longridge's comment is that his own experience of breakdowns leads to the conclusion that the scoffer at miracles must be a very superficial observer of ascertained facts. The stress upon the two bolts from the inertia of the piston and connecting rod was about 6,000 pounds, or about 7,000 pounds per square inch of sectional area at the bottom of the threads, to which would be added the stress due to the friction of the piston. It is wonderful that the bolts lasted 3 years under such heavy stresses.

Another chosen illustration is a horizontal gas engine, 15 months old, working with Dowson gas; cylinder 15¼ inches diameter by 23-inch stroke; with a speed of 184 revolutions per minute. The big end of the connecting rod was of the marine type, with 2 bolts, 9¼ inches long, between the head and the screw, and 2¼ inches long in the screw—total length 11½ inches. The bolts were 1¼ inches diameter, except for a length of 1⅞ inches in the middle of the shank, where the diameter was reduced to $1\frac{5}{32}$ inches. The threads were Whitworth standard, seven per inch. One morning, the upper of the 2 bolts broke through the thread next to the shank, and the lower bolt was stretched till its diameter was reduced to $1\frac{3}{32}$ inches, and then it broke at the reduced section. The piston was forced back into the clearance, and cracked circumferentially half way round the groove for the ring next the end. The cylinder end, liner and jacket were all broken, and the connecting rod and valve spindles bent. The stress upon the bolts due to the inertia of the moving parts was about 9,000 pounds, or about 5,030 pounds per square inch of sectional area at the bottom of the screw thread, assuming the stress to be equally distributed upon the 2 bolts. Besides the normal stress due to inertia, the bolts had been subjected to abnormal stress soon after the engine was first set to work, by the piston seizing and splitting the back end of the liner. The engine had worked for 405 hours in 1905, 2,214 hours in 1906 and 378 hours in 1907—in all, 2,997 hours, during which time it had made about 33,100,000 revolutions.

The case is quoted of a horizontal gas engine, 4 years old, working with gas from a town main. The cylinder was 18 inches diameter by 20-inch stroke, and the speed 162 revolutions per minute. The little end of the connecting rod was forged with a flat palm, to which the two brasses and cap were secured by two bolts 1¼ inches in diameter, screwed with six threads per inch. Shortly after starting the engine one morning, one of the bolts in the little end of the connecting rod broke through the screw thread, the outside brass and cap were torn off, the palm at the end of the rod was bent and the other bolt broken. The cylinder liner was broken, the piston cracked and the connecting rod bent, besides minor damage. The stress on the bolts, due to the inertia of the piston, would be about 5,570 pounds, or 2,220 pounds per square inch of sectional area through the bottoms of the threads. The stress due to the friction of the piston is unknown. The engine had made about 103½ million revolutions. The bolts were said to have been made of vanadium steel.

An accident with a horizontal gas engine driven by suction gas is noticed. The engine was 7 months old, with cylinder 20 inches diameter by 30-inch stroke, running at 160 revolutions per minute. Being unable to start the engine after the dinner hour one day, and observing water running down the exhaust valve spindle, the attendant concluded that the joint between the liner and its water jacket was leaking. He therefore took off the covers to examine the compression chamber, and found about a gallon of water in it, and a crack about 7 inches long in the side of the chamber near the sparking plug. A new cylinder end was ordered from the makers' stock, and an inspector was sent to examine it before it was sent off. He found several of the ribs connecting the outer to the inner walls of the jacket cracked, although the casting had never been in use. The cracks were not long enough to render the end unserviceable; but the uncertainty as to the rate at which they might extend, and the direction the extensions might take, compelled the inspector to condemn the casting. As there was not another in stock, the engine had to be kept idle for 3 weeks, while a new cylinder end was moulded, cast and finished. The cause of the first fracture is uncertain, though as the jacket was clean it was probably a stress produced by unequal expansion of the different parts of the casting. The cause of the second was no doubt contraction of the inner wall of the jacket after the outer had become set. If the core of the compression chamber had been removed and the casting cooled from the inside, the ribs probably would have remained sound. The problem of designing an end which will not crack under the high temperatures and pressures obtaining in the cylinders of internal combustion engines has not yet been solved, though very marked progress has been made.

(To be Concluded.)

THE 6-foot 6-inch water gas set, which is to be constructed by the Gas Machinery Company, of Cleveland, O., to the order of the Pittsfield (Mass.) Coal Gas Company, will be completed in ample time for the winter demands of the Company's consumers. The output at Pittsfield showed some surprising gains the past summer on account of fuel use.

The Wiring of Old Buildings.[1]

Strange as it may seem, the wiring of old buildings for the use of electricity is not attended with the muss and damage incident to the installation of gas pipe, for instance, or of plumbing work. In frame houses it is possible to install a complete job of wiring with flexible armored cable without cutting the walls at all except where outlets and switches are to be installed, and usually where care is exercised these can be inserted in the walls without damage to the decorations or plaster work. In brick dwellings, especially where party walls are encountered, it is necessary to cut chases in the party wall, 1-inch or 2-inch wide, depending on the number of circuits to be installed, if outlets are desired on the party wall; but in all other cases the flexible armored cable may be run between the studding of partitions, above the lath in the ceiling, between floor joists, across notches cut in the floor joists or back of the lath on front, rear and side walls where furring is used between the wall and the lath. The furring on front and rear walls varies in thickness from 2-inch to $\frac{7}{8}$ of an inch, and the furring in side walls is usually $\frac{3}{4}$ of an inch thick. The outside diameter of twin No. 14 wire, flexible armored cable is approximately $\frac{7}{16}$ of an inch so that it will readily pass back of the lath of ceiling and walls that have been furred.

In brick or other dwellings where decorations are to be made after the wiring work is completed, it is usual in the interests of economy to avoid circuitous routes from outlet to outlet and to cut chases in a direct line if possible, the woodwork, of course, being spared. It is very much cheaper in cases of this kind to cut and patch than to spend material, time and labor in running a long circuit in order to avoid any cutting. Where a house is already decorated care must be exercised to avoid damaging the decorations, but where a house is to be redecorated the most expeditious method of installing the wires is the best, it being taken for granted, of course, that any wireman will use reasonable care and judgment and not make unnecessary muss or cause damage.

The accompanying illustrations show an 8-circuit job in a 4-story brick dwelling. Flexible armored cable was used and the interior was to be redecorated so that the extra care which would be bestowed on a building already decorated was not exercised. The illustrations, however, cover an ordinary job of this kind, and in some instances the plasterer added to the size of the chases, etc., in preparing the rough edges for his work, and the chase cut in the wall near the ceiling, in Fig. 5, was made by a gasfitter in running down the short length of pipe shown for a drop lamp and not by the electrician.

The panel box is located on the second floor in a hall closet, as shown in Fig. 1. The box is built in sections, each section holding two cut-out blocks. One-inch flexible conduit is run from the meter board in the cellar to the bottom of the panel box, the conduit being shown stuffed to keep out foreign matter. Four circuits run from each side of the panel box; one for the top floor, one for the third floor, two for the second floor, two for the first floor, one for the basement and cellar, and one for the night or hall lamps. The standard connector with lock-nut is used to fasten the armored cable to the panel box and about 8 inches of wire is left free for making connections. The conduit is grounded.

Figs. 2 and 3 are views taken in the parlor on the first floor. In this room there are four wall outlets and a switch, besides two chandeliers. There is a high baseboard along the bottom of the wall and a cornice at the ceiling, which it was desirable not to cut. The illustrations show the same side of the room next a party wall. The switch controlling the circuit is near the outlet on the hall partition wall and the circuit runs from the switch to the first outlet and then down to the floor. Passing under the floor joists the flexible cable is run above the lath to a point under the second outlet on the hall partition wall near the front of the house. From here the circuit passes up between the studding to the outlet and down again, crossing the floor between joists and thence up back of the lath on the front wall to a point about level with the outlet, whose position is fixed by a gas connection. From this point to the outlet a 2-inch chase is cut in the plaster and brickwork to accommodate the cable, as shown in Fig. 2. From this outlet the circuit returns to the front wall and passing down runs under the floor joists to the partition wall between the rooms. The cable is run up between the studding and is brought out to outlet shown in Fig. 3 through a 1-inch chase cut in the wall. The circuit ends at this outlet. It should be pointed out here that in all work of this kind it is usual to end the circuit on brick walls, if possible, so as to avoid excessive cutting as much as possible. As will be

1. *Electrical World.*

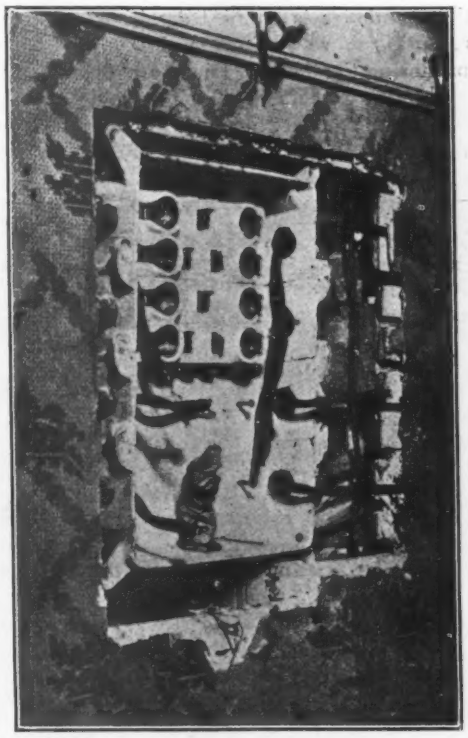


Fig. 1.—Panel Box in Hall Closet.

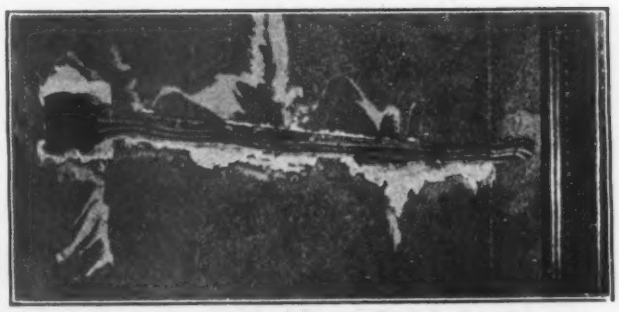


Fig. 2.—Chase in Party Wall.

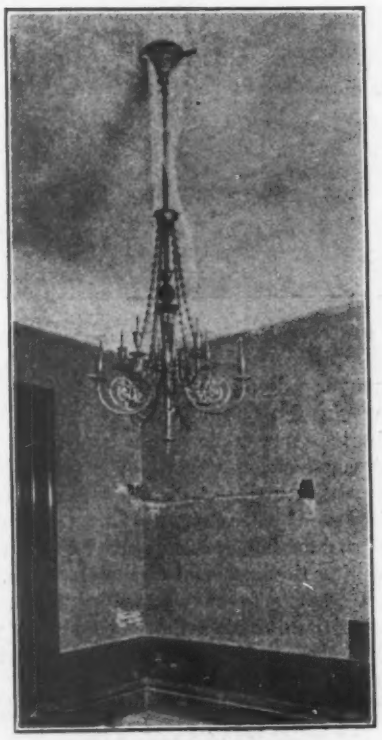


Fig. 3.—Chandelier and Side Wall Outlet.

noticed, the chandelier is connected without any cutting whatever, the wires running above the lath on the ceiling; furring pieces being using in plastering the house. The box used to cover the gas pipe at the outlet has a lip in the side which is knocked out by a hammer blow so as to permit the box to be slipped over the pipe.

Fig. 4 shows how two outlets in the library were wired, the position

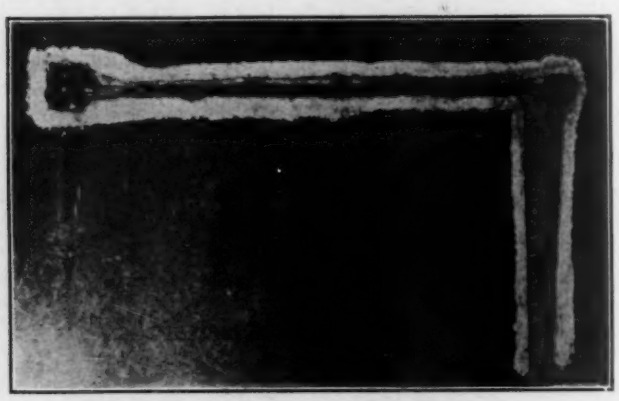


Fig. 4.—Connecting Two Side Wall Outlets.

of the outlets being fixed by gas brackets already in use. In this case a vertical chase was cut in the wall to the first gas outlet. and then a chase was cut horizontally along the gas pipe to the other outlet. As is evident from the engraving, the plasterer had already begun working on these chases.

Fig. 5 shows an upper bedroom wired for chandelier lighting and

Fig. 5—Bedroom Wired Without Cutting Walls.

for a drop lamp over a dresser against the back wall. The circuits in this room are overhead between the ceiling and joists, and the hole shown above the dresser was made by a gasfitter. The circuit is fed into the chandelier from the nearest outlet and from there to the switch on the partition wall. A circuit also runs from the chandelier to the side outlet over the dresser. By this means the lamp over the dresser may be operated independently and is not under the control of the switch governing the lamps on the chandelier. In work of this kind it is not necessary to cut the walls at all. Fig. 6 shows the method of running the flexible armored cable. A pocket or board is taken up and the helper pulls in the cable at the other end, while the electrician guides it between the joists and lath.

Fig. 7 illustrates the method of installing the night or hall lamps and switches. The house being 4 stories high there is a lamp on the first, second and third floors, and these may be controlled from any floor. One wire of the circuit runs from the switch to the outlet on the third floor, to the outlet on the second floor, and thence to the out-

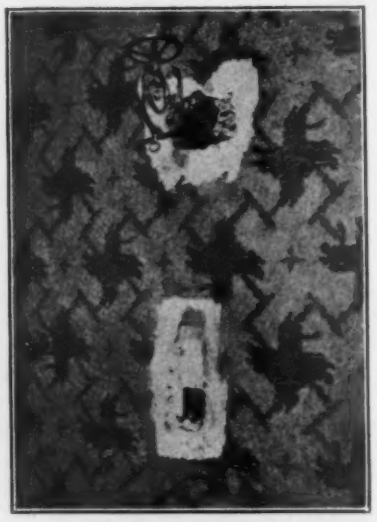


Fig 6.—Switch and Outlet for Hall Lamp Circuit.

Fig 7.—Method of Installing Flexible Armored Cable Above Ceiling.

let on the first floor; the other wire connects each outlet with one side of the feeder. A 3-way switch is placed on the first and third floors, and a 4-way switch is placed on the second floor. The opposite side of the feeder circuit is connected to the switch on the first floor, and two wires run from the first switch to the 4-way switch on the second floor, from which in turn two wires run to the 3-way switch on the third floor. In this way multi control of the lamps is provided, although there is no direct connection between the lamp and switch on the second floor. The plasterer in this case also is responsible for the appearance of the wall.

In work of this kind it is rather difficult to lay down any regular price for the work per outlet. It is usual where plans are prepared to measure the length of the circuits with a rotometer, add in the number of outlets, etc., required, and then gauge the cost of labor and the length of time required from experience and records of work of a similar nature. By means of records kept of other installations, a very close approximation of the amount of time required to make an installation can be made. The cost of material can be found exactly, but the item of labor can only be determined from past experience.

The illustrations show how very little cutting is necessary in a job of this kind. Were it not for party walls, the entire installation could have been made with almost no cutting and without spoiling any decorations, although, as was pointed out, the house was to be redecorated, so that the latter consideration was not of much importance. The installation shown was made in New York city and fulfills all the requirements of the National Board of Fire Underwriters.

THE Board of Trade, of Welland, Ont., has addressed a letter to several candidates for election to Parliament at the general election of officers of the Dominion for the ensuing term, asking each for an expression of opinion concerning the matter of prohibiting the exportation of natural gas to the United States. The Board has extremely radical ideas in the negative on this question.

Industrial Power Business from a Central Station Viewpoint.

[By Mr. W. F. Lloyd, in *Elec. World.*]

In a great many cities and towns there are large numbers of manufacturing establishments depending upon their isolated power plants for the operation of their machinery, a great majority of which are depending upon one engine and the skill of the attendant for the entire production of the establishment.

It is evident that great economies would be effected if all of these individual power plants were combined in one large electric generating station, managed by men who have made a life study of the generating and distribution of energy, and operated by men especially skilled in this particular line of work. The equal division of the economies effected would mean a handsome profit for the manufacturers, as well as for the central station company.

In several instances a systematic canvass has been made by central station companies among the manufacturing establishments in certain localities, the results of which have been very satisfactory, not only in the way of immediate business, but also by securing a complete record of the industrial situation throughout an entire territory.

The best results seem to have been obtained by employing canvassers with some little knowledge of engineering practice, who were not expected to interest the factory owner beyond the point of securing the data necessary for their report to the commercial engineering department of the central station company.

The canvasser should be required to secure information upon the following points:

Name.
Address.
Business.
Person to see.
Present form of motive equipment.
Present form of lighting.
Engine rating. Number of units.
Boiler rating. Number of units.
Pumps other than boiler feed.
Approximate age of equipment.
Is engine loaded to its rating?
Is present equipment giving trouble in any way?
Engine and boiler room labor consists of.
Could engine and boiler room labor be eliminated upon the introduction of central station service?
If not, why?
If electric generator is used, give voltage and rating.
Also the purpose for which it is used.
Is exhaust steam used in the manufacturing process?
If so, for what purpose and approximately what proportion of boiler equipment is required for this purpose.
Hours per week plant is operated.
Is plant ever operated overtime?
Is energy supplied to tenants?
Are any alterations or additions contemplated?

The canvasser should use the argument that the central station company desires the above information for the purpose of determining whether it can be of any service to the owner in effecting greater economy in the operation of his mill. The reports should be carefully analyzed by a commercial engineer, and such cases as would indicate possible business being then turncd over to a power salesman; the reports on cases apparently hopeless should be filed and indexed for future use.

It is a recognized fact among central station men that the industrial power burners require special treatment on account of the engineering features involved. Commercial engineering departments have been organized by a number of central station companies to encourage the use of their product in the manufacturing establishments in their respective territories and to assist the general solicitors of the company in securing this desirable class of business. That the business is desirable is evident when we consider that it enables one to make the station and line equipment productive during the time when only a very small percentage of this equipment can be utilized in producing energy for lighting purposes, while in strictly industrial motor business the energy consumption in kw-hours per year per kilowatt connected is greater than any other form of central station load (electric heating being classed as an industrial load), and consequently less station and line equipment is tied up for a given output of energy.

It might be said at the start that it is an impossibility to follow any set rule in the handling of power propositions, each case requiring special analysis and treatment. There is one thing, however, that applies to all cases, and that is the importance of getting the prospective customer sufficiently interested to entertain a proposition from the central station. After this has been done, it is a simple matter to convince him of the necessity of establishing some basis on which to estimate the probable energy consumption in the event of equipping his mill or factory with motor drive; any figures quoted without a foundation only engender a feeling of distrust, and unless one can gain the confidence of the man with whom he is dealing he has little chance of obtaining the business.

There are a number of cases in which it is not necessary or desirable to make an elaborate engine or motor test, especially in plants where the equipment rating involved does not exceed 20 or 25 horse power. In such cases it has been found desirable to show the prospective customer just what the consumption is in similar plants in actual operation, indicating to him just what is known to be the average consumption of energy per horse power connected in his particular line of business.

This method gives an estimating basis that appeals to a man as being very practical, and if one can cite a case in his neighborhood it is still more convincing. Care should be taken, however, to indicate to him that there is no way of ascertaining with absolute accuracy just what his energy consumption will be, as this will be governed by the amount of business that he does, the consumption rising and falling with the production of his plant. The latter is another argument in favor of the central station service, as the cost of steam or gas power does not fall off in the same proportion to the production, on account of the fixed charges and heavy constant friction load of a steam or gas engine plant.

Consider now the question of the larger motor business where it is not only desirable but necessary to enter into the details of all phases of the proportion.

Take, as an example, a mill that is being driven at present by, say, a 500-horse power steam engine equipment. Generally the first step would be to ascertain the actual horse power developed by the engine by means of the ordinary indicator, readings being taken to determine the power needed to drive the shafting or friction load alone, the average working load and the maximum load of the mill. Wherever possible these conditions should be noted for each floor or section of the plant, in order to assist in determining the proper size of motors to be used. Where the load is a very fluctuating one, such as in machine tool or other metal working shops, readings should be taken at 15-minute intervals over the entire working day of 10 hours, the average of all these readings being assumed as the average working load of the plant. A sketch of the shafting and machinery layout should then be made to assist in deciding upon the proper distribution of motors throughout the plant, and to determine how much of the friction load can be eliminated by the motor drive. An estimate of the probable energy consumption should be then made, allowing for whatever friction load can be eliminated, and taking into consideration the motor efficiencies.

To better illustrate these various steps in handling a proposition of this character a specific case has been selected as a fair example of the points involved. The case in question is the plant of an estate in one of our large cities. Floor space in this property is rented to various tenants for light manufacturing purposes, mechanical energy being furnished by the estate at a certain rate per horse power per year.

Prior to May 1, 1907, mechanical energy was supplied by a 100-horse power steam engine, which arrangement necessitated long lines of shafting and belting to reach the various tenants throughout the building, with consequent waste of energy, due to the heavy friction load. At the present time the steam engine has been disposed of and the entire load is carried on central station service, all wasteful line shafting and belting have been removed and each tenant is provided with a motor belted direct to his machinery, a meter installed at each motor records the actual energy consumed by each tenant, thereby giving the estate an accurate basis on which to distribute the charges for electrical energy.

Prior to the installation of motor drives the steam plant was run at a loss. Under the present arrangement a profit is made by the estate upon the energy supply without increasing the rental charge to the tenants; moreover, considerable valuable floor space was made available for rental purposes by the removal of the steam engine and use-

less shafting and belting. The motor installation consists of 8 motors ranging in rating from 3 to 10-horse power, the average being 5.7-horse power. The load factor of the entire installation is approximately 50 per cent.

The prospect of obtaining the above customer was brought to the attention of the central station company with which the writer was connected during a systematic canvass in the fall of 1906; the opening made by the canvasser was immediately followed up and permission was secured to make tests and get the data necessary for formulating a proposition.

The first step in this case was to make a drawing showing the general arrangement of the transmitting machinery and the location of the various groups of machinery to be driven. This drawing served a triple service in acting as a guide in making the engine test by showing what shafting and belting could be eliminated and what section could be motor driven; it was of great assistance in determining the most advantageous manner of motoring the plant, and it afforded a strong argument in presenting the central station proposition by showing graphically the saving in energy and maintenance expense that could be effected by the elimination of a mass of wasteful shafting and belting and rendering floor space available for rental.

The next step was to place an indicator on the steam engine to determine the proper sizes of motors and to determine the probable consumption of energy in the event of the central station proposition being accepted. With this information it was a simple matter to make deductions and formulate a proposition.

It might be said that one of the strongest points in securing this business was the confidence inspired in the mind of the prospective customer by the thorough manner in which the investigation was made, and upon which the central station proposition was based. It is not meant by this statement that it is considered good policy always to discuss a mass of details with a prospective customer. Nine out of 10 men are not interested in these minor details as long as they are confident that a record of actual conditions has been secured and that the proposition has been based on these conditions.

It will be noted from the statement just made that the investigations are made mainly with a view to determining the two most important points involved in the central station proposition, namely, the combined rating of the motors necessary to drive the machinery and the probable consumption of energy to operate the plant.

There is another point that has not been touched upon and which is important in some cases, namely, the question of heating the building in the event of shutting down a steam engine.

As this can be done at low boiler pressure, not requiring the services of a licensed engineer, and is only of 5 months' duration in the majority of cases, it is not found to be a very serious obstacle; but where close figuring is necessary and a few dollars may swing the case one way or the other, a heating estimate is got up based upon the cubical contents of the building, its exposure, number of windows, temperature to be maintained, etc., which enables one to tell very closely what will be the consumption and cost of coal in heating the building, to which is added the labor and whatever other costs are involved.

It is therefore apparent that to arrive at the total cost of operating the plant in the event of the introduction of central station service, this heating figure must be added to the cost of current supply, which gives the figure in competition with engine plant cost.

Bureau of Information, The American Gas Institute.

BUREAU OF INFORMATION,
THE AMERICAN GAS INSTITUTE,
HEADQUARTERS, 716 LOCUST STREET, ST. LOUIS, MO.
W. A. BAEHR, Chairman.

Question No. 19.—Given any typical American city of 150,000 population and upwards, which is constantly growing at a rate which will show an increase of population of at least 25 per cent. every 10 years, and assuming:

(*a.*) That there is no gas plant in the city.

(*b.*) That a corporation having ample resources wishes to install a gas plant in this city.

(*c.*) That this corporation desires to start with a gas distribution system which can readily expand to meet the constantly increasing demands of the city.

(*d.*) That the corporation is governed by a policy through many years to permit following the given distribution plan absolutely as required.

(*e.*) That the use of gas will expand at about the same rate as it has since the year 1900.

(*f.*) That this corporation is willing to go to any reasonable expense in the installation of the best distribution system that can be devised, and be a commercial success, then question:

What is the best distribution system to install? Give reasons and such general calculations which will show why you formed that conclusion? Consider the following kinds of gas distribution and any other types that may occur to you?

1. Low pressure gas from works.
2. Low pressure, installing district holders as city grows, pumping gas to district holders in any way you wish to calculate.
3. Low pressure, with medium pressure re-enforcement, say up to 10 pounds per square inch, with district holders, and pumping plants at district holders for use during peak load, and with governors feeding into the low pressure system at given distances apart, in addition to regular low pressure supply from plants and holders.
4. Same as (3), without district holders and all pumping at gas plants.
5. Medium pressure, say up to 10 pounds per square inch on entire system, with governors before each meter. No district holders.
6. Low pressure, with feeders carrying say from 10 pounds to 60 pounds per square inch, with governors feeding into low pressure general system at given distances apart and without district holders, and all compressing done at gas plants.
7. Same as (6), except using district holders with compressing plant for peak load use and governors feeding into low pressure system as in (6).
8. High pressure, say from 10 pounds to 60 pounds per square inch on entire system, with individual governors on each service. No district holders.
9. Such other systems as may occur to you.

It is understood that this is a general question and not one for a cousulting engineer. Assume the usual conditions of electrolysis incident to American cities.

ANSWER BY THE BUREAU OF INFORMATION.

The question as stated is decidedly a theoretical one, and the questioner evidently intended an answer which would incorporate only the very general principles governing the best and most up-to-date installation of gas distribution as it should be applied in large cities. The question states that the corporation has ample resources. The only effect this would have on the installation would be that funds would be available at the start to install such construction as would insure economies in operation, which could not be obtained by a company which, for lack of funds, would have to allow the cost of first investment to have greater importance and weight in the designing of the system than the subsequent economical operation of same.

Having ample funds, the company, of course, would install such materials as would have the longest life, and since the underground conditions are those for the average American city, it follows that cast iron should be selected for the pipe line, as opposed to either wrought iron or steel. Cast iron would last for an indefinite length of time. The life of wrought iron or steel pipe, on the other hand, would comparatively short. The system then would be one in which cast iron mains would be used, and since the service is to be as nearly perfect as possible, it follows that one of three methods or combinations of same must be used:

(1.) The size of the mains must be exceptionally large, so that the drop in pressure will be very small; or,

(2.) An individual governor must be installed in the house of each consumer, with high pressure in the mains; or,

(3.) District governors can be installed which will control the pressure in the districts in which they are located, the gas being brought to these governors under medium or high pressure through ordinary size mains.

The first proposition is not economical on account of the excessive cost of the large mains, except for a limited space around the plant, as for instance, in a compactly built, and comparatively small business district near the works, wherein would be located office buildings, stores, hotels, restaurants and industrial consumers, all using large quantities of gas.

The second proposition is not advisable for the following reasons:

(*a.*) There will be added expense of operation, due to the necessity of periodically inspecting the governors.

(*b.*) There is an added danger due to the fact that high pressure gas is conducted through the services into the houses so that a leak in one of these services would be of greater importance than a leak from a service carrying low pressure gas.

(*c.*) In a city of 150.000 inhabitants there would be probably 30,000 governors, and it would be impossible to be sure at all times that these 30,000 governors would be giving satisfactory service. One can never be absolutely sure as to what a governor is doing, except by constant observation.

The third proposition seems, on the whole, to be the most advisable, from the fact that practically all of the advantages of low pressure distribution are obtained, as far as it concerns the bulk of the mains and all of the services. The pressure is governed at only one point in each district, and it is, therefore, easy to predict the corresponding pressure at each consumer's meter. The system is absolutely safe, and there will be no expense due to complaints or poor pressure, or from the necessity of inspection, as is the case where governors are used.

Since cast iron mains are to be used, the pressure will vary from 2 to 8 pounds per square inch. This will allow us to utilize the simple blower engines. The higher pressures will only be used as the city expands to the point where additional high pressure mains will otherwise be necessary.

Owing to the relatively low pressure at which the gas is pumped the loss in candle power will be negligible. The pumping stations being at the works, the cost of pumping will be a minimum. As the city grows it would probably be advisable to install a holder at some carefully selected point in the city, and on the belt line, which would supply the various manholes. A duplicate list of machinery would have to be installed at the works, and when the holder is installed a pumping unit could be installed there also.

Individual cases, however, might readily arise, where a combination of all these systems would be the most desirable. For instance, low pressure distribution might be very advantageous in a given district adjacent to the works, and in the largest portion of the city the system No. 3 in this answer might be most economical and satisfactory. However, individual governors might be advantageous in certain isolated districts, either temporarily or permanently, as may develop, and also could be installed along the lines of the high pressure mains, thus avoiding a low pressure main paralleling same.

In general, the higher the distribution pressure the greater, of course, is the economy in the cost of mains. As this distribution pressure increases, however, the greater becomes the liability to extinction of burners in case of temporary breakdown of the pumping machinery, and consequently duplicate or other equivalent machinery becomes very necessary. It should be added, as an additional argument in favor of low pressure distribution, reinforced by medium pressure boosting, that, in a city of the size assumed in the question, up to several times that size, it is not necessary to pump all the gas, or nearly all the gas. The ordinary holder pressure on the booster mains during, say, 16 hours out of the 24, will usually furnish enough gas to the governors to take care of the consumption off the peak load periods, whereas with only high pressure distribution every foot of gas delivered must be pumped.

The difference in the amount of standard machinery, wear and tear and repairs to same, with labor and power, is a not inconsiderable item. While the largest part of the expense of pumping is usually the fixed charge, the labor item and friction load power are sufficiently great, so as to make the reduction in the number of hours that the plant is operated a very considerable item of saving. Various other points bearing on this question will be treated in a paper on "High Pressure Distribution," which will be presented at the meeting of the American Gas Institute, October, 1908.

Question No. 24.—"Can you give the comparative results of any experiments as regards fuel economy, clinker prevention, and heat regulation, as well as other operating features, of the use of return flue gas as compared to preheated air and steam on any recuperative benches in any gas plant where the results would be viewed as being worthy of careful consideration?"

ANSWER BY THE BUREAU OF INFORMATION.

All the data that the Bureau has collected, giving comparative results as regards fuel economy with the use of return flue gas as compared with preheated air and steam, has been such as to not warrant any definite conclusions. Instances are now recorded where certain managers have claimed as low as 230 pounds fuel per ton of coal carbonized on ½ depth benches of 6's, equipped with a return-flue gas system. If these figures are to be relied upon, they are approximately 70 pounds better than any record that we have been able to obtain on benches of similar construction where steam is used under the grate bars. On benches of 8's fuel economy of 200 pounds per ton of coal carbonized has been reached by actual tests where the return flue gas method is used. We know of no installation of 9's where the benches are equipped with the return flue gas proposition, whereas benches of 9's have been operated preheating the primary and secondary air, and using steam on the grate bars, where furnace fuel per ton of coal carbonized ran as low as 215 pounds, the coal used in all instances quoted being ¾-inch screened "Youghiogheny" gas coal.

As regards the clinker proposition, the return flue gas method prevents clinkers where same is properly operated. The heat regulation of a bench equipped with the return flue gas system is easy and simple. With Youghiogheny gas coal, and coke made from same, there should be no trouble with clinkers and heat regulation where steam is used under the grate bars.

The Bureau wishes to add that it seems possible in practice to satisfactorily operate the coal gas furnace with a supply of ½ pound of steam per pound of fuel burned. Assuming water to be supplied beneath the grate bars at 60° F., and that this water is evaporated at an average temperature of 150° F., and that chimney gases are discharged at 950° F., and that the mean specific heat of steam between 150° F. and 950° F. is .55, and that there is no waste at the chimney of unburned water gas formed from this steam, then the wasted sensible heat and latent heat of evaporation of this ½ pound of steam at the stack easily figure to 758 B.T.U. Assuming the fuel to be coke having a calorific value of 12,500 B.T.U. per pound, this heat loss is 61 per cent. of the heat of the coke. This 61 per cent. would, therefore, seem to be the chief necessary waste of heat caused by the use of steam over the heat waste with the use of return flue gas.

The difference in fuel consumption which will be found in actual practice may, however, differ entirely from what is indicated by the foregoing. In many cases the regulation of steam supply to the grate may be poor, and the average quantity used far greater than the foregoing ½ pound, with proportionately increased heat waste. Also the return flue gas system may give such better condition of fire as to cause less fuel losses in other ways; for instance, the loss of unburned fuel may be less, although there is no necessary difficulty in maintaining good fires with the use of steam.

Question No. 26.—"Is water gas higher in heat units than coal gas; and if not, why not? Explain why it is richer in illuminating value?"

ANSWER BY THE BUREAU OF INFORMATION.

In reply to this question the Bureau will say that it will not attempt to go into the theory of the various hydrocarbon constituents of coal gas and water gas, but will confine its answer to an elementary statement of the conditions.

It is well known that, with Pittsburgh coal, yielding from 4.95 to 5 cubic feet of gas per pound, the candle power varies from about 16.5 to 18 with the Argand burner, and that the gross calorific value will be in the neighborhood of 650 B.T.U.

With water gas the question of heat value is largely dependent on the amount of oil used per 1,000 cubic feet of water gas made. A water gas of 22-candle power, with the results of 5.75-candle power per gallon of oil, will give a gas of approximately 650 to 660 B.T.U. gross.

It is to be understood, of course, that if no oil were used at all the uncarburetted water gas resulting would have a calorific value of about 320 B.T.U. Adding oil increases the amount of those rich hydrocarbon constituents in the resulting gas, which have high illuminating and calorific values. Therefore, a considerable range in candle power and heat value can readily be secured in the manufacture of carburetted water gas, simply by varying the amount of oil used per 1,000 cubic feet made. In as far as the high illuminating value of carburetted water gas is concerned, it is to be said that this is simply due to the richer hydrocarbons resulting from the use of oil. These richer hydrocarbons are usually grouped under the heading of "illuminants," and, in order to cite the difference, an example is given from the operation of one large works, as follows: When obtaining about 5 cubic feet of gas per pound, from Pittsburgh coal, the per cent. by weight of illuminants in the resulting coal gas was about 17.15. That particular works, on the same day, was making water

gas, using 3.78 gallons of oil per 1,000 cubic feet of water gas made and the resulting gas contained illuminants to the extent of 24.7 per cent. by weight. In general, therefore, higher candle power of the water gas is caused by the higher content of these illuminants.

The Bureau wishes to call attention to the answers to Questions Nos. 21 and 22, which both bear on the subject of candle power and calorific value of coal and water gases, said answers having been previously published in the JOURNAL.

Question No. 32.—"We are selling our light gas at $1.50 per 1,000 net, and our fuel gas at $1 net, necessitating the double installation of meters at many consumers. We wish to put all the gas on one meter, but cannot afford to reduce the price of all our gas to $1, and do not believe it good policy to raise the price of fuel gas; but this seems the only method to pursue. If you can tell us of some instance where the rate has been raised and with what results, or suggest some way in which we can eliminate the use of two meters, we shall very much appreciate the information."

ANSWER BY THE BUREAU OF INFORMATION.

We do not know of an instance where the price of gas has been raised in the manner suggested in the question. There have been cases where competition has for a time placed the gas rate at a low point that was later re-established on a fair basis. Companies which formerly sold gas for lighting purposes at one rate and fuel gas at a lower rate have eliminated the double installation of meters by making a reduction in their lighting rate to that of the existing fuel rate. It seems that the question reduces itself to a matter of how to produce the greatest net earnings. Most companies will probably advise you that, within a short time they were, through increased sales at a lower rate, able to make up the decrease brought about by the reduction. While it is expensive to maintain a double installation of meters, this expense is probably small compared with the revenue yielded by the higher rate at which illuminating gas is sold. Our conclusions would be:

First.—That there is no precedent for equalizing the prices of gas used for both purposes, if this requires a raise in price charged for fuel gas.

Second.—That while the equalizing of prices would appear to tend to reduce the future possible earnings of the company, general experience would seem to show that it rather increases it.

ANSWER-AT-LARGE.

There is only one answer to Question No. 32, assuming that the conditions cited cannot be altered. Use one meter, charge $1.50 per 1,000 for an initial amount, based on either the size of the house, number of illuminating burners, or some combination of these or other influencing factors, and charge $1 per 1,000 for all amounts in excess of this initial quantity- As an example of a charge made on this basis the Omaha Electric Light and Power Company is cited, whose light rate is 14 cents for the first 1½ kilowatt hours for each 16-candle power lamp and 6 cents per kilowatt hour for the remaining amount in excess of this.

Items of Interest
FROM VARIOUS LOCALITIES.

OUR readers will note the advertisement on page 589 of this issue, regarding Receiver's sale of the Bennington (Vt.) gas plant, on Thursday, October 22d. This plant is new, and, we learn, well built, with a good business already started, that could probably easily be doubled with a little push and enterprise, as the 470 meters already installed were secured practically without effort or solicitation. Over $90,000 has already been spent upon the plant. Bennington is an old, wealthy and historic town, showing a good, healthy growth, having almost doubled its population within the past 16 years. The forced sale of a new gas plant as described in "ad." referred to, in an up-to-date town like Bennington, is certainly worth investigating.

THE article entitled, "Attitude of the Law Toward Electricity," which appeared in our issue for the 7th ult., was originally prepared for the "Journal of Electricity, Power and Gas."

LAST Friday, Mr. Arthur D. Mackie, took up the duties of General Manager to the Springfield (Ills.) *News*, which paper is controlled by Mr. Charles N. May and associates. In 1892 Mr. Mackie become connected with the Walbridge syndicate and his success was marked from the start. In 1906, when the Peoria (Ills.) Gas and Electric Company came under control of the syndicate, Mr. Mackie was put in charge as Business Manager of the Springfield and Peoria Companies and his methods met with a measure of success which attracted much attention from his Western contemporaries; in fact, so large was the measure of attention that he was finely induced to leave the lighting field to engage in another that presents many attractions for a man of his temperament. We are sorry that his ways are no longer those over which we travel, but the wish that goes out to him, that as it was in the old so shall it be in the new, is positive and sincere.

MR. J. F. DAWSON, of the Denver (Col.) Gas and Electric Company, was elected President of the Colorado Electric Light, Power and Railway Engineers' Association, at its annual meeting held last month in Glenwood Springs, Col.

THE Cruse-Kemper Company, of Ambler, Pa., has been awarded the contract for the construction of a gasholder, up to retaining 150,000 cubic feet, on the plant of the Mifflin County Gas and Electric Company, Lewistown, Pa. The holder is to be finished towards the close of December.

MR. ORVILLE D. COLLINS, who resigned in 1907, as General Manager of the Redlands Home Gas and Electric Company, to accept a prominent place on the staff of the Modern Land and Irrigation Company, was recently killed in an automobile collision. For quite a period deceased had been identified in one way or another with prominent engineering enterprises of Colorado. Spokane, Washington, was his headquarters.

SOME days ago Justice Greenbaum, of the New York Supreme Court, overruled a demurrer of the Corporation Council, of New York city, to the answer filed by the Mutual Gas Light Company against the suit by complainant to compel the Company to remove its main and services from the streets on the ground that the franchise had lapsed. The city charged that the Company was maintaining a continuous trespass in failing to remove said pipes. Its permit, which it received from the Board of Aldermen, was for 30 years, and the time having expired in 1898, the city alleges the Company had no right to the use of the streets without a renewal of the permit, which permit had not been renewed. The Company in answering, maintained that it did not have to obtain permission from the municipal authorities to continue in the use of the streets, as its charter provided that such consent was unnecessary if a majority of the abutting property owners agreed to the laying of the pipes. While it is true that the Board of Aldermen's permission was for 30 years, the Company held that the long time which the pipes and mains had been used without protest, operated as a consent from the property owners. Therefore the Company was maintaining its pipes by virtue of its charter, and so contended that it did not need the permission of the municipal authorities. In his demurrer the Corporation Council asserted the Company's answer was insufficient in law. Justice Greenbaum held otherwise, and in analyzing the Company's charter the Justice said: "There is no doubt the Legislature intended to grant a franchise without the consent of the municipal assembly, and while the wisdom and propriety of exercising such a power may well be questioned, we are, nevertheless, in this case confronted with an instance where the Legislature did see fit to grant a franchise without requiring the consent of the municipal assembly, and, what is more extraordinary, without even the consent of the administrative officers of the city charged with the duty of caring for its streets, provided that the consent of the abutting property owners to dig up the streets was obtained by the defendant."

MR. W. S. FLEMING, Attorney for the Columbia (Tenn.) Water and Light Company, has offered these plants to the city for purchase and operation on city account.

"O. R. M.," writing to the JOURNAL under date of Chicago, September 26th, incloses the following: "The proposed new 20-story office building of the Peoples Gas Light and Coke Company, at Michigan avenue and Adams street, will be quite the highest building of its kind in Chicago, and will also rank amongst the highest in the country. It will front 196 feet on Michigan avenue and 171 on Adams street, will be 260 feet in height—the limit permissible under the city ordinances—and its cost will exceed $3,000,000. It will con-

tain 8,700,000 cubic feet of floor space, and it will number quite close to 1,500 offices. The external walls will be of granite, to the top of the third story, and will be finished to the top in dull glaze terra cotta, quite similar to the effect shown in the beautiful Chicago structure known as the Railway Exchange Building. The first floor will be devoted to the offices and show rooms of the Company, and the upper portions will be occupied by tenants and the Company. Altogether, six floors of the edifice will be needed by the Company for its own use. The work of demolishing the structures now existing on the site will be commenced the 1st prox., and the architects, Messrs. D. H. Burnham & Co., say the purpose is to have the structure completed by January 1, 1910. It will be put up in two sections, the first of which will comprise all except the corner builing, which will be occupied by the Company until the balance of the structure is finished."

THE executive management of the Peoples Light Company, recently incorporated to build and operate a combined gas and electric plant in Corpus Christi, Tex., is as follows: President, George A. von Blucher; Vice-President and Treasurer, Clark Pease; Secretary, George Heye, Jr.; Superintendent and General Manager, Thos. E. Craig. It is said the plant can be put up for $40,000.

MESSRS. NORTH AND PETTIGREW, as representatives of the Warren & Pettigrew Company, who are seeking a franchise under which to construct and operate a gas plant in Antigo, Wis., ask that the grant be for a period of 30 years, and agree to supply gas at a rate not to exceed $1.25 per 1,000 cubic feet. They also agree that work on the plant shall be commenced on or before June 1, 1909, and that gas shall be distributed on or before December 31, 1909, at which time no less than 3 miles of mains shall have been laid.

THE season of professional meetings of the American Society of Mechanical Engineers will be opened, so we are informed by Secretary Lester G. French, the evening of Tuesday, October 13, with a meeting of the Gas Power Section, in the Building of the Engineering Societies, 29 West 39th street, New York. Mr. Henry L. Doherty, Chairman of the Meetings' Committee of the Section, will present a report for discussion, outlining plans for future work. There will also be a discussion of standards to be used in gas power work. Two papers are promised. The first by Mr. S. A. Harvey, on gas producer plants, with data upon costs, performances, etc., the other, by Mr. N. T. Harrington, giving the results of tests to determine the loss of fuel weight in a freshly charged producer, due to increase of ash contents in the fuel bed. The first paper will be illustrated by lantern slides, showing plants and plans for the arrangement of apparatus, etc.

"V. W.," incloses the following, from Denver, Col., under date of the 25th September: "Like getting a legacy from a long-lost uncle! That is how some gas consumers have been made to feel recently when they received checks for small amounts from the Denver Gas and Electric Company, as a rebate on their gas bills. Few people know much about the somewhat complicated system used by the Company in accounting with its patrons, and many have forgotten the provisions of the franchise granted the Company by the city in 1906. Therefore when they get some of their lighting money back from one of the so-called soulless and grasping public service corporations they sit up and wonder what will be the next miracle to happen. The total amount refunded will reach $20,000. It is all very simple, as explained by General Manager Frank W. Frueauff, and really the Company can do nothing else under its franchise. The fact that it is earning all its fixed charges, 6 per cent. dividend on its stock, and then some, may make it all the more complacent about giving this money back, but it is giving it back, and this is the reason: In the franchise grant of 1906 it was provided that the Company should not receive for the two ensuing years up to 1908 more than an average of 95 cents per 1,000 on its gas output. For 2 years from the beginning of 1908 the average rate was to be 90 cents per 1,000, and the average rate is to be constantly diminished every 2 years until it is reduced to 75 cents per 1,000. The Company had no way of estimating what its average receipts per 1,000 would be for these 2 years until it had gone along for a time and found what the probable consumption would be. The 8 months of this year have furnished a basis for estimating what that consumption will be. The Company consequently has made a reduction sufficient to bring its receipts down to the franchise requirements of 90 cents and has rebated to a certain class of consumers the difference between the new rate which is reckoned as of January 1 and the old rate, under which it has continued to collect since that time. But it must not be inferred that everybody is to be benefitted directly by the reduction. Only those who have taken the readiness-to-serve service and those who may now take advantage of the readiness-to-serve rate will get their money back. When the Company's permitted receipts were fixed at 95 cents only those who consumed 45,000 feet of gas or more per year could find any advantage in the readiness-to-serve plan, but under the new 90-cent limitation consumers of 30,000 feet per year can take this service with advantage. The Company is, therefore, sending out to all consumers who, since January 1, have used a proportionate part of 30,000 feet per year or more and giving them new contracts under the readiness-to-serve rate and refunding the excess that it has collected already over the present rate. There has been no change made in the price to the small consumer who uses under 30,000 feet per year. He must continue to pay the old rate of $1 per 1,000. All consumers have the option of taking the dollar straight service or the readiness-to-serve service, but the small consumer finds that there is no advantage to him in the option."

"J. G. T.," writing from Troy, N. Y., under date of September 26, incloses the following: "The Public Service Corporation for the upper New York District gave a public hearing on the complaint of Henry Hudson, Mayor of Hudson, against the Albany and Hudson Railway Company (the latter operates the gas and electric lighting supply of the named place) in the matter of the price of gas in that city. Randall J. Le Boeuf, for the Company, entered a general denial as to the charges being excessive or exorbitant. On the charge made in the complaint that the Company was not legally authorized to sell gas in Hudson, Judge Cady said that the city would withdraw that portion of the complaint. The Commission handed down to both parties a list of interrogatories prepared by its expert. The complainant was given until October 1 to ask for additions to the interrogatories submitted, and the Company was given 5 days thereafter in which to answer the additional interrogatories or to object to those submitted. The Company is given until October 20 in which to answer the interrogatories and a further hearing was appointed for that day."

THE San Bernardino (Cal.) Gas and Electric Company proposes to extend its distributing system to and through the outlying section known as Rialto.

HERE is shown a queer state of affairs, taking for granted that the story is in the main correct. "On the morning of September 22d, a fire broke out in the premises, Eighth and Thorndike streets, Cambridge, Mass., where an Italian named Bischieri carries on the business of maccaroni manufacture. Having extinguished the flames the firemen went through the establishment. In the cellar they found a jet of gas burning, but a further examination failed to uncover a gas meter. The firemen reported to the police and the police notified the Company. On examination of the latter's meter route books no meter was found listed for the maccaroni shop. A warrant was issued for Bischieri charging him with larceny, and he was held in $2,000 bail. The strangest thing about it all is that the Cambridge Company had not detected the thief long before the firemen did."

MR. M. SPRINGER at the head of the speculators who are proposing to operate a gas plant in Sheridan, Wyo., insists that they propose to build and operate a works in good faith, chiefly for the sake of investment—not for quick bond issuing exercises. They must have a lot of faith.

A CORRESPONDENT in Danbury, Conn., sends this, under date of the 30th ult.: "The much discussed probability that the gas question would be used in selecting the representative from Seymour to the General Assembly, seems to have been given a quietus through the announcement of the Seymour Electric Light Company that it would take no action at all on its own account for bringing gas into the town of Seymour this year. The reason for this is due to the general business depression and the uncertain state of the money market at present. Mr. George E. Matthies, Secretary and Treasurer of the Electric Light Company, stated positively that the Company had decided to do nothing further in the matter, nor would it interpose any interference with the new Company going ahead with its plans. He said that his Company was not warranted at the present time in making such an outlay of money as would be necessary in equipping an adequate gas plant for Seymour, and that, if the other Company was able to go ahead with this work, nothing at all would be put in the way; in fact, if gas were introduced in Seymour, he said, the Seymour Electric Light Company would probably be one of its patrons."

The Market for Gas Securities.

Consolidated was steady to strong all the past week. It will, however, be decidedly higher before November first. Every factor points to a further sharp advance in it, unless the parties to all sides of the present absord presidential canvass get right down to blows or bullets. The dignity of the American politician! Just a shade between the President of the United States and the Chairman of Tammany Hall!

Brooklyn Union is strong at 139 to 144. Peoples, of Chicago, is 95 bid, and it is undeniably getting well taken out of the market. Massachusetts gas is again finding its way upward, and the business back of it is going along at a gate that warrants a swifter move in the shares. All classes of gas bonds show material increases in value. A special instance is the gain during the last 12 months in New Amsterdam 5's, general mortgage, Feb. 1, 1908, 86; Oct. 2, 100.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

OCTOBER 5.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid*	*Asked.*
Consolidated Gas Co.	$73,177,000	100	147	147¼
Central Union Gas Co.—				
1st 5's, due 1928, J. & J.	3,000,000	1,000	93	93¼
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	130	160
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	102
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98	104
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	100	105
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	90	98
Standard	5,000,000	100	70	100
Preferred	5,000,000	100	100	125
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	131	144
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	2	2½
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
" " Bonds, 5's	5,250,000	1,000	63	66
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	20,500,000	100	91½	92
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	92	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	71	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,000,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	—	—	74½	75
Detroit City Gas Co	6,000,000	50	—	50
" Prior Lien 5's	4,618,000	1,000	—	98
Detroit Gas Co., 5's	881,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	100	105
" Bonds, 5's	10,500,000	—	101	102½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	200,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	—	100
Preferred	2,500,000	100	80	90
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	106¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	56	56¼
Preferred	25,000,000	100	86½	86¾
Montreal Gas Co., Canada	9,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Sept. 9, 1908.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 15th, 1908, to stockholders of record at the close of business, Sept. 30, 1908. Checks will be mailed.

1736-5 LEWIS LILLIE, Treasurer.

RECEIVER'S SALE.

BENNINGTON GAS PLANT.

There will be sold at public auction, to the highest bidder, at the office of the Bennington Gas Company, Ritchie Block, Bennington, Vermont, on Thursday, the 22d day of October, 1908, at 10 o'clock in the forenoon, the property of the Bennington Gas Company, with perpetual franchise, said property consisting of lot, one gas tank, capacity 50,000 cubic feet, generator, etc., good brick buildings, situated on railroad (private switch), about 7.5 miles of mains, ranging from 6 to 12 inches; also 470 meters now in use. The annual output is about 7,000,000 cubic feet, but ought to be much more next year, as many new meters were added last spring and summer, with a large demand for gas unsatisfied. Candle power, 18; proportion sold for fuel purposes, 90 per cent.; gas stoves in use, about 425; process of manufacture, Davis; price of coal delivered, $4.50; price of oil per gallon delivered, $0.0425; population of district supplied, about 8,000. The plant was built in 1905.

Sale will be for cash, and a 20 per cent. deposit made to secure bid.

Sale subject to the approval of the Chancellor.

Correspond for further particulars with W. E. Putnam, President, Bennington Gas Company, or

ALEXANDER K. RITCHIE, RECEIVER.

BENNINGTON, VT., September 26th, 1908.
1733-1

SMALL GAS PROPERTY

WANTED

In Eastern States, in town of not less than 5,000. Run-down property needing extensions preferred.

1739-4 Address, "J.," care this Journal.

City of Boston—Street Department.

To Contractors for Street Lighting and Manufacturers of Street Lighting Apparatus:

The Superintendent of Streets of the city of Boston, 47 City Hall, invites parties having street lighting apparatus adapted to systems other than the present system of low pressure gas mantles to demonstrate, if they so desire, during the continuance of the present contract for street lighting, with a view to the improvement of the present system upon the expiration of the present contract on September 15, 1909.

GUY C. EMERSON,
SUPERINTENDENT OF STREETS.

BOSTON, September 23, 1908.
1739-1

MANAGER FOR GAS PROPERTY

Solicits Correspondence or Interview.

An experienced and competent manager and superintendent desires change from present position to one offering greater opportunities. Capable of handling gas property in manner to bring best results. Would not care to consider position in city of less than 20,000 population. Age 35; 15 years' experience. Is member of and will attend October meeting of Gas Institute. Solicits interview at that time.

Address, "MANAGER AND SUPERINTENDENT,"
1737-3 Care this Journal.

Position Wanted

By a young married man as superintendent of manufacturing and distributing coal gas; 7 years' experience. Results guaranteed. Can furnish good references.

1738-3 Address, "C.," care this Journal.

Position Wanted

As Manager or Superintendent,

By competent gas man, 35 years of age, married, strictly sober, with operating experience both as manager and superintendent in actual charge of plants. A man who can show and give results; 17 years' experience; now acting as manager of coal gas plant in city of 15,000. Will have to give present people 60 days' notice. Address,

1727-eot-tf "RESULTS," care this Journal.

WANTED,

Position as solicitor for gas and general appliances, or to handle men in new business department.

1739-1 Address, "N. S.," care this Journal.

Position Wanted

As All-Round Workman.

Competent workman in all departments of the gas business. First-class references.

1739-2 Address, "J. H. M.," care this Journal.

WANTED,

Information of a growing town of 5,000 population or over, in which we can build a gas plant or water works.

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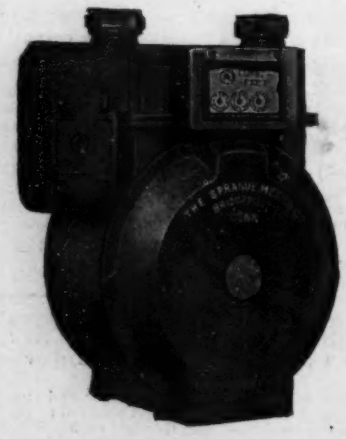

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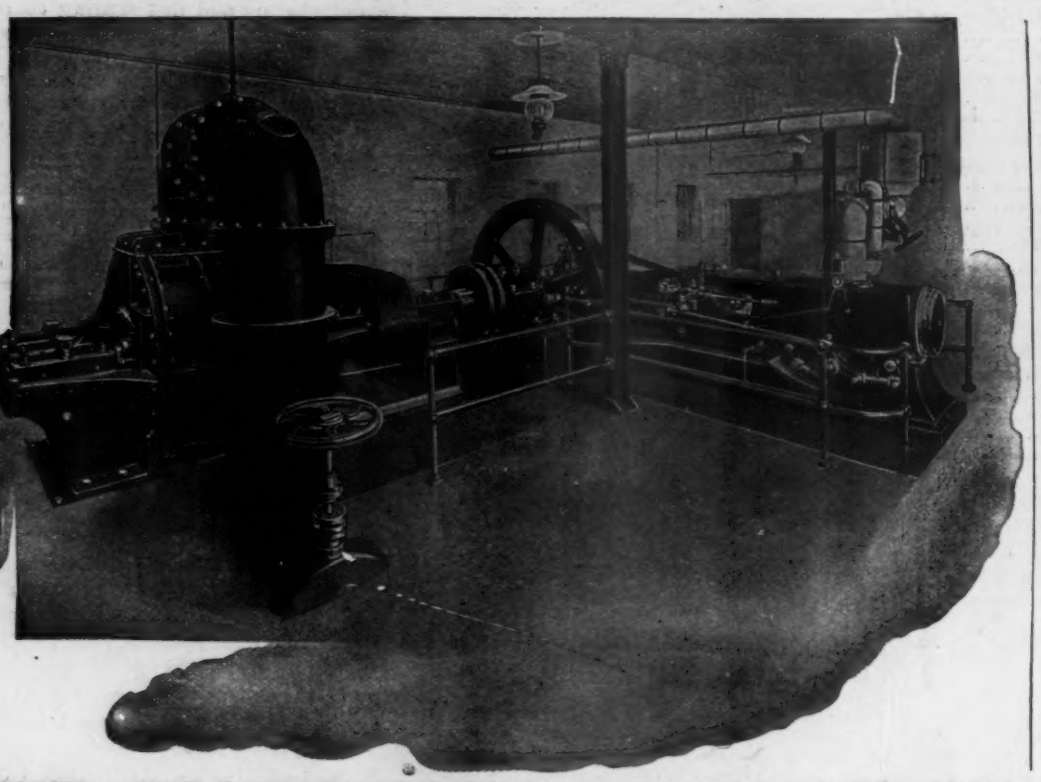

THIS cut shows one of our High Pressure machines and a 4-valve engine connected by one of our leather link flexible couplings. Two of these units were installed for the Peoples Gas Light and Coke Co., Chicago, at their 73d St. Station. Each machine has a capacity of 14,000,000 cubic feet per day.

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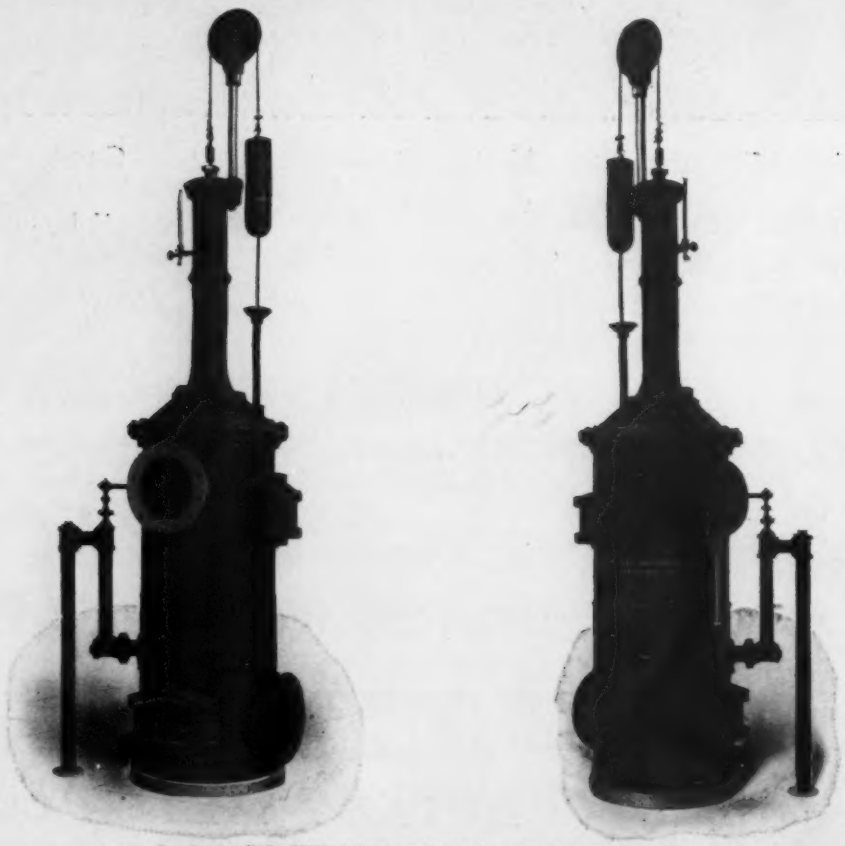

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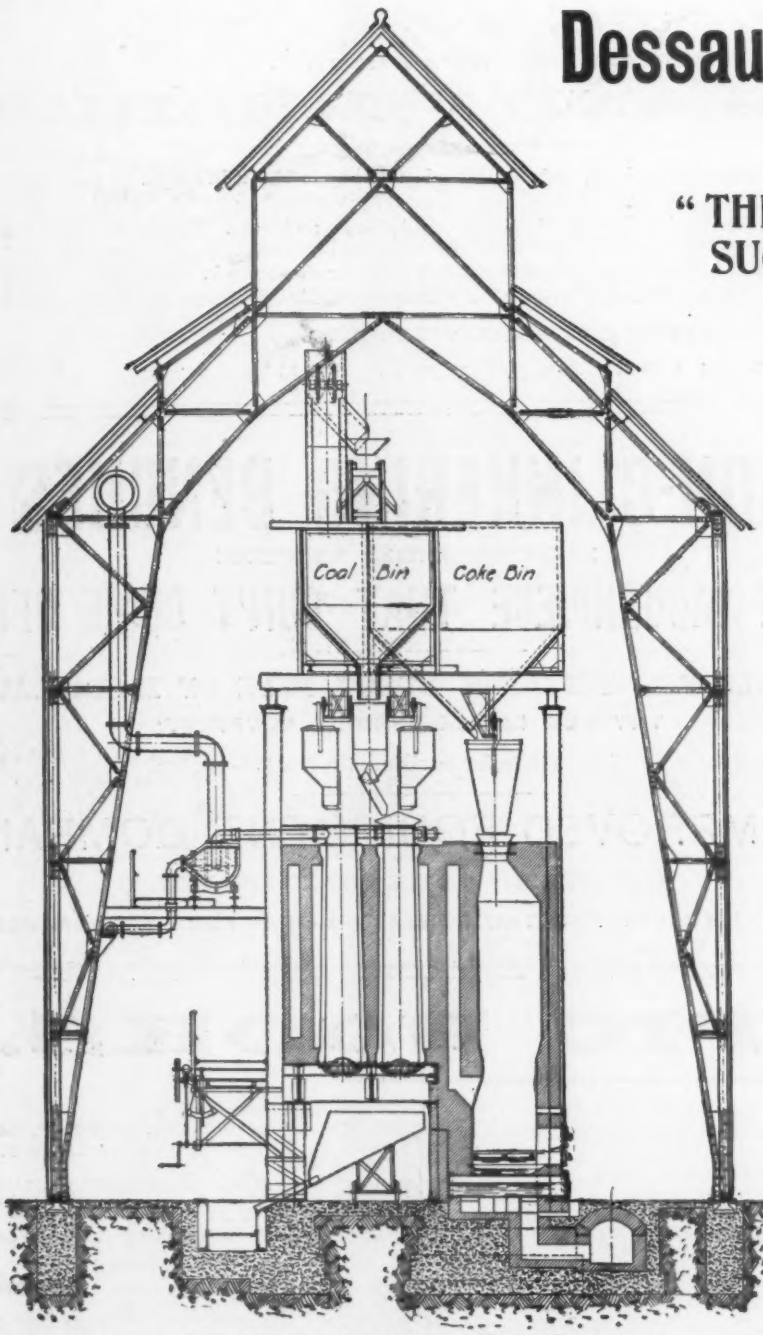

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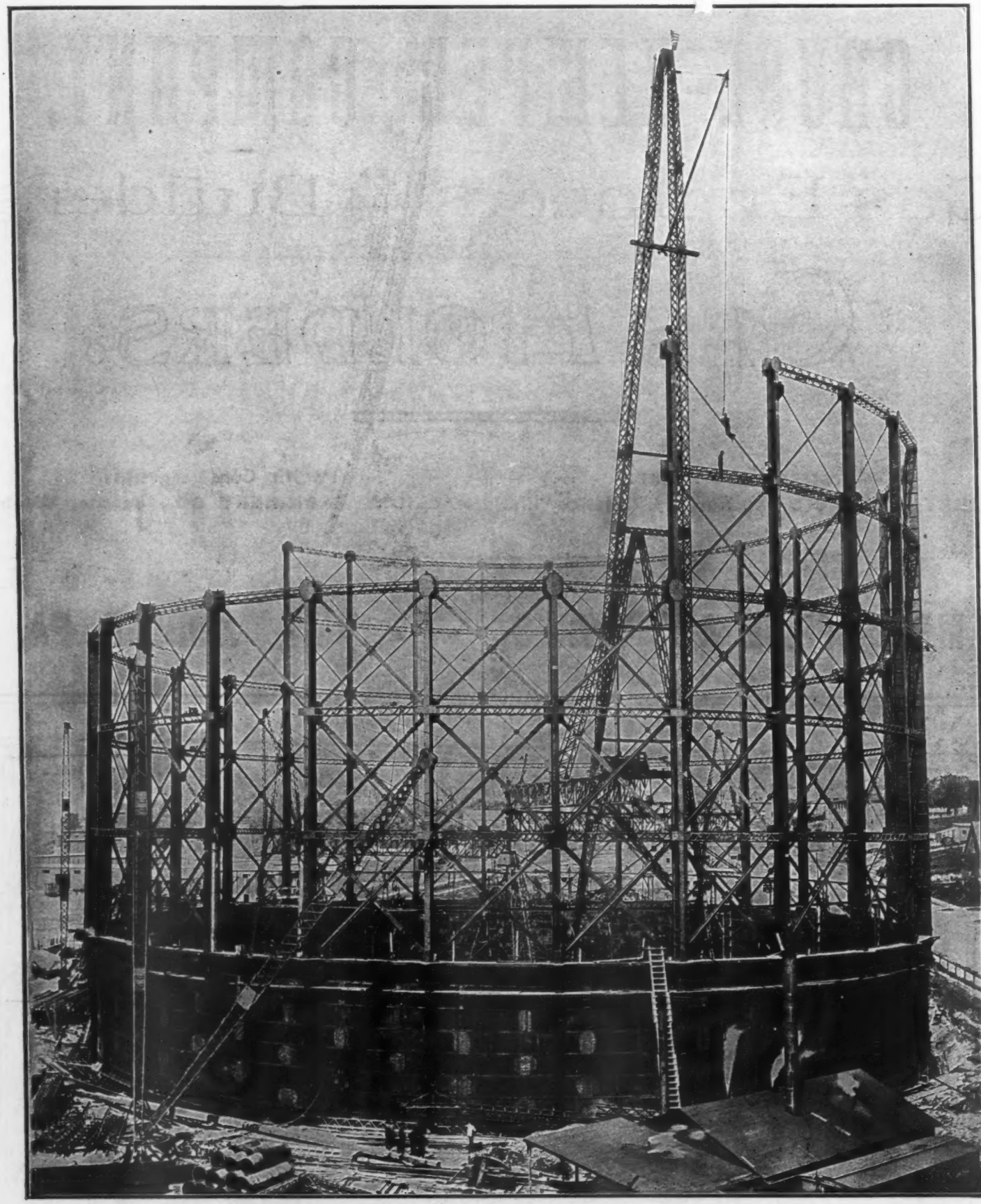

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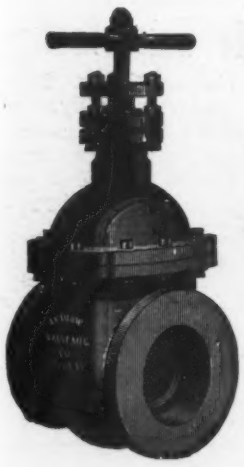

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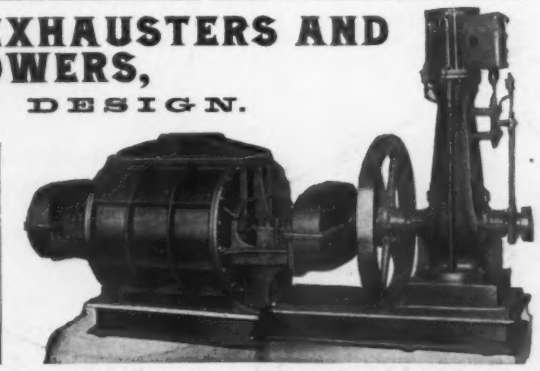

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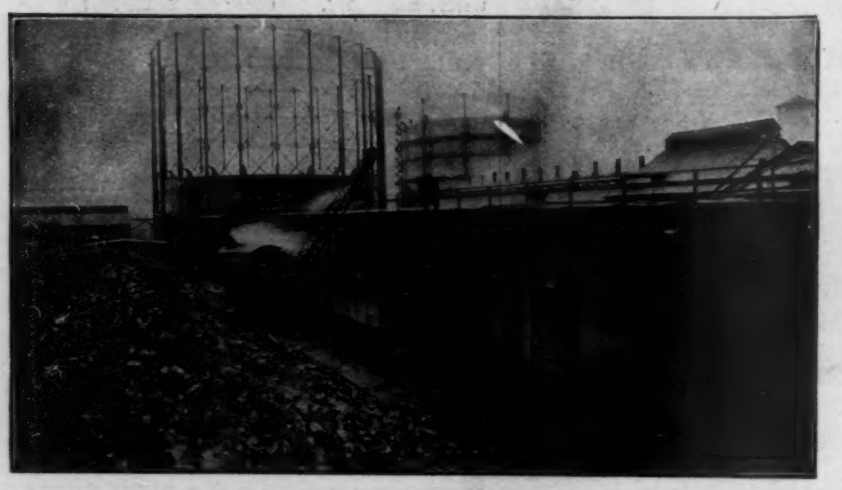

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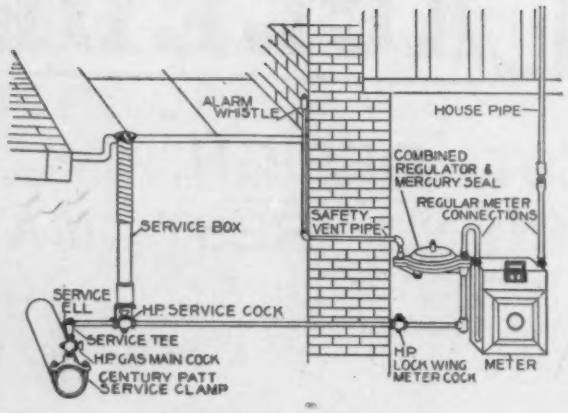

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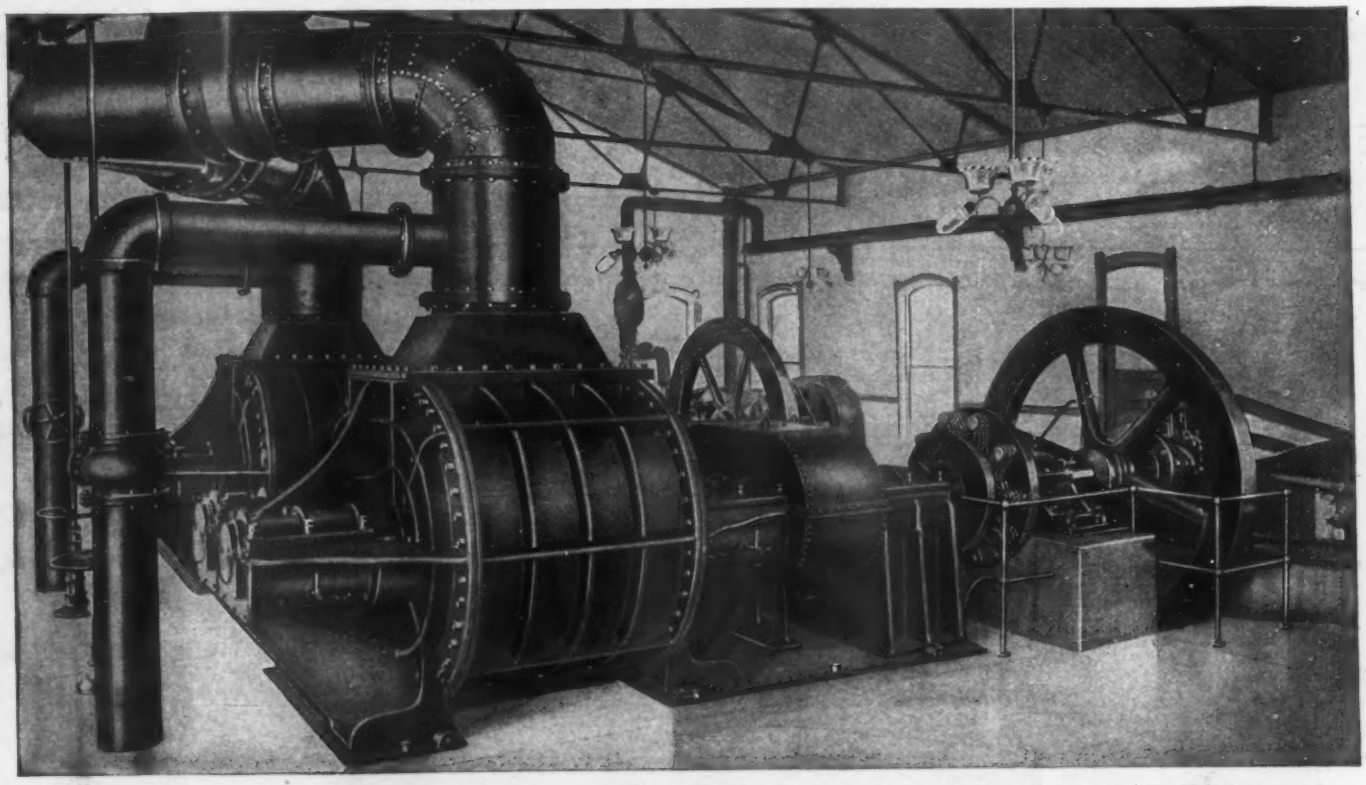

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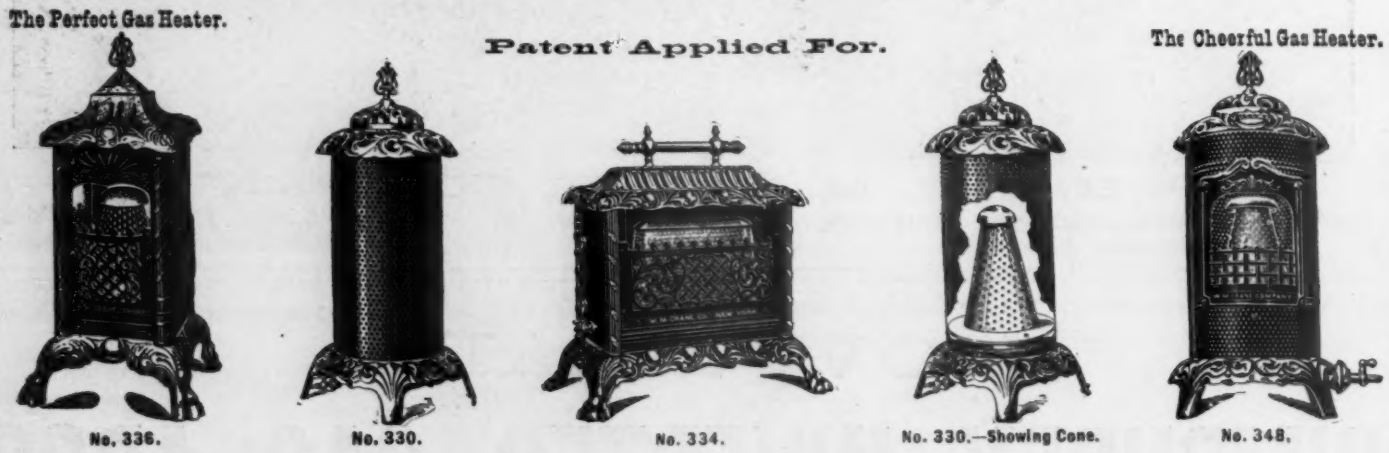

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PUBLIC LIGHTING TABLE.

OCTOBER, 1908.

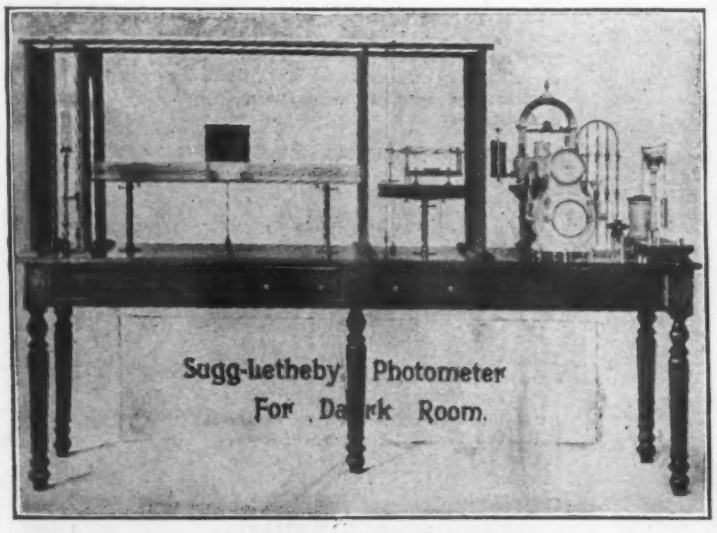
Table No. 1.
FOLLOWING THE MOON.

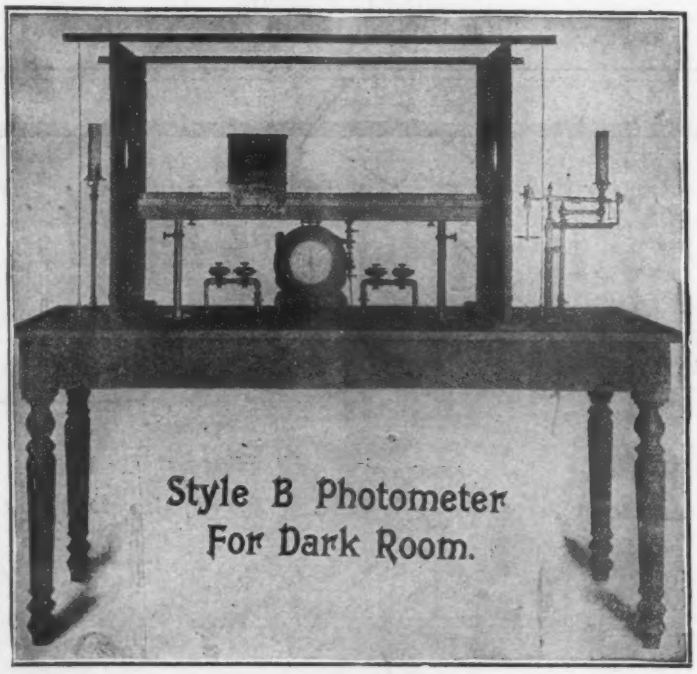
Day of Week.	Date.	Light.	Extinguish.
Thu.	1	8.30 PM	4.50 AM
Fri.	2	9.20 FQ	4.50
Sat.	3	10.20	4.50
Sun.	4	11.30	5.00
Mon.	5	12.40 AM	5.00
Tue.	6	2.00	5.00
Wed.	7	3 10	5.00
Thu.	8	No L.	No L.
Fri.	9	No L. FM	No L.
Sat.	10	No L.	No L.
Sun.	11	5.50 PM	7.50 PM
Mon.	12	5 50	8.30
Tue.	13	5.50	9.10
Wed.	14	5.50	9.50
Thu.	15	5.50	10.40
Fri.	16	5.50 LQ	11.40
Sat.	17	5.50	12.30 AM
Sun.	18	5.40	1.30
Mon.	19	5.40	2.30
Tue.	20	5.40	3.30
Wed.	21	5.40	5.20
Thu.	22	5 40	5.20
Fri.	23	5.40	5.20
Sat.	24	5.40 NM	5.20
Sun.	25	5.30	5.20
Mon.	26	5.30	5.20
Tue.	27	5.30	5.20
Wed.	28	5.30	5.20
Thu.	29	7.20	5.20
Fri.	30	8.10	5.20
Sat.	31	9.20	5.20

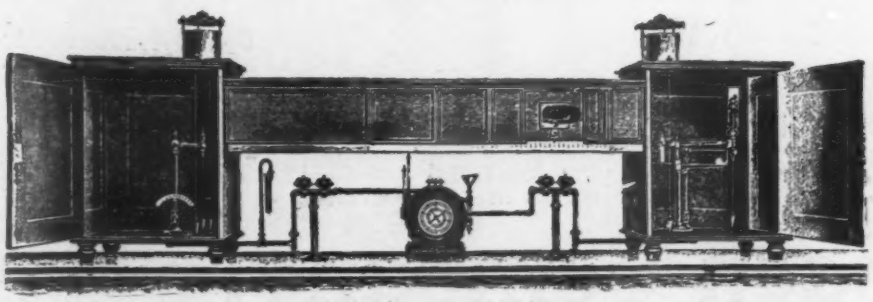
TOTAL HOURS DURING 1908.

By Table No. 1.

	Hrs.Min.
January	228.30
February	187.30
March	192.00
April	160.10
May	155.10
June	138.00
July	155.50
August	173.40
September	185.20
October	214.00
November	218.10
December	226.40
Total, yr.	2235.00







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PUBLIC LIGHTING TABLE.

OCTOBER, 1908.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Complete Lighting in One Hour (From Time Given) P. M.	Complete Extinguishing in 50 Minutes (From Time Given) A. M.
Thu.	1	5.22	4.42
Fri.	2	5.22	4.42
Sat.	3	5.22	4.42
Sun.	4	5.22	4.42
Mon.	5	5.22	4.42
Tue.	6	5.22	4.42
Wed.	7	5.22	4.42
Thu.	8	5.12	4.52
Fri.	9	5.12	4.52
Sat.	10	5.12	4.52
Sun.	11	5.12	4.52
Mon.	12	5.12	4.52
Tue.	13	5.07	4.52
Wed.	14	5.07	4.52
Thu.	15	4.57	5.02
Fri.	16	4.57	5.02
Sat.	17	4.57	5.02
Sun.	18	4.57	5.02
Mon.	19	4.57	5.02
Tue.	20	4.57	5.02
Wed.	21	4.57	5.02
Thu.	22	4.47	5.07
Fri	23	4.47	5.07
Sat.	24	4.47	5.07
Sun.	25	4.47	5.07
Mon.	26	4.47	5 07
Tue.	27	4.47	5.07
Wed.	28	4.47	5.07
Thu.	29	4.37	5.17
Fri.	30	4.37	5.17
Sat.	31	4.37	5.17

TOTAL HOURS DURING 1908.

	Hrs.Min.
January	481.50
February	329.15
March	351.50
April	341.50
May	233.05
June	218.10
July	282.55
August	254.55
September	292.25
October	420.45
November	374.30
December	411.05
	3992.35
Deduct on account of 50 min. extinguishing time	30.30
Total, yr.	3962.05

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Richmond, Va. (2d contract).
Oak Bluffs, Mass.
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TOTAL DAILY CAPACITY, TO DECEMBER 31, 1907, ... 545,865,000 cu. ft.

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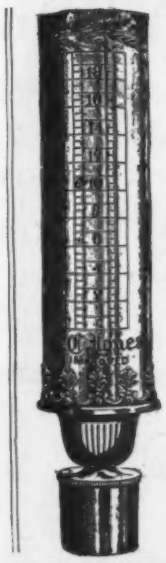

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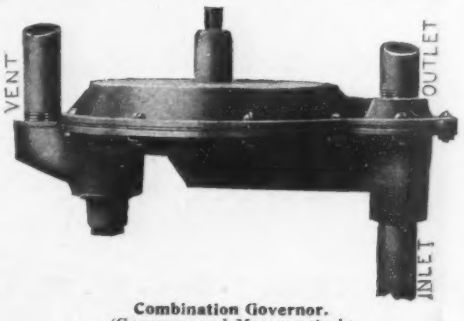

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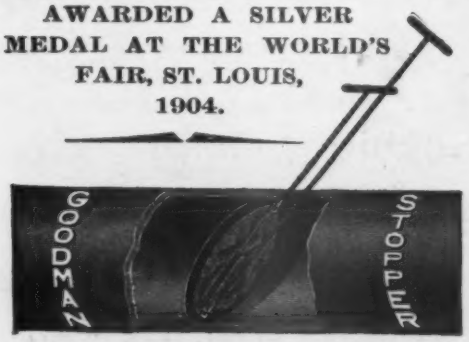

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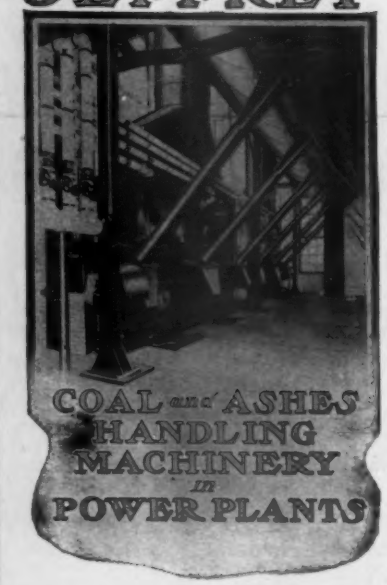

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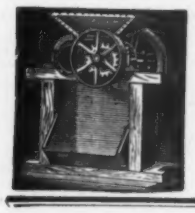

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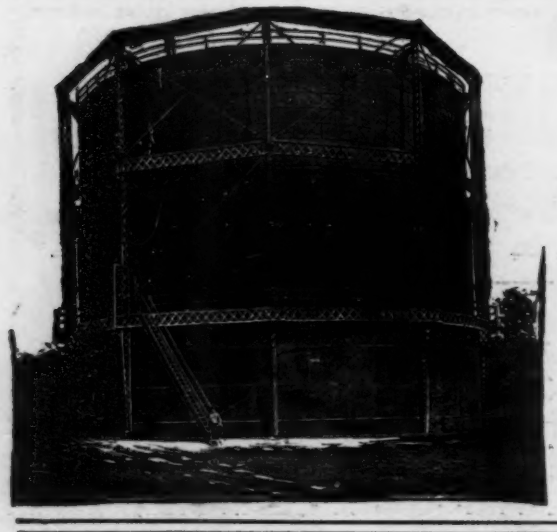

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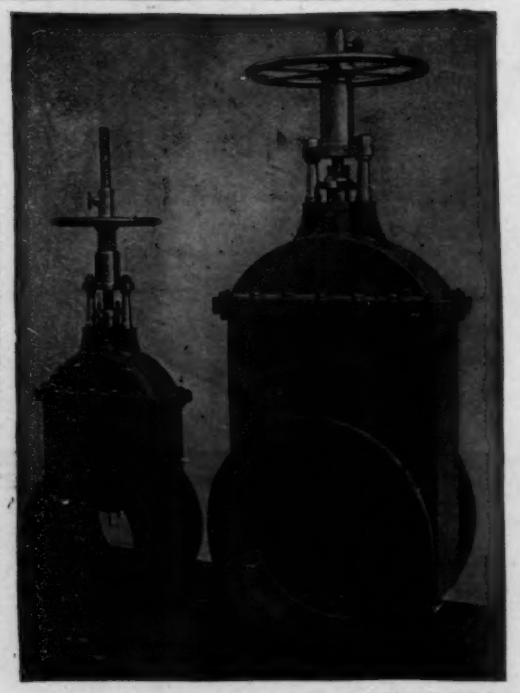

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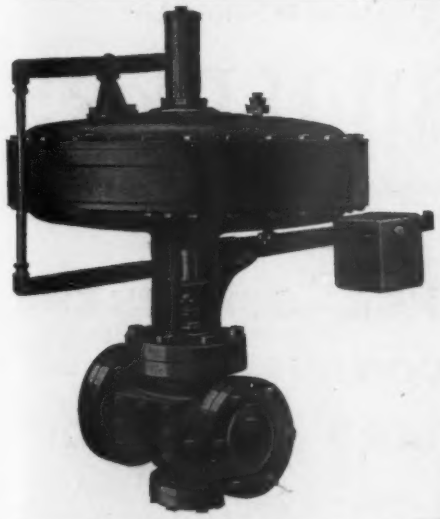

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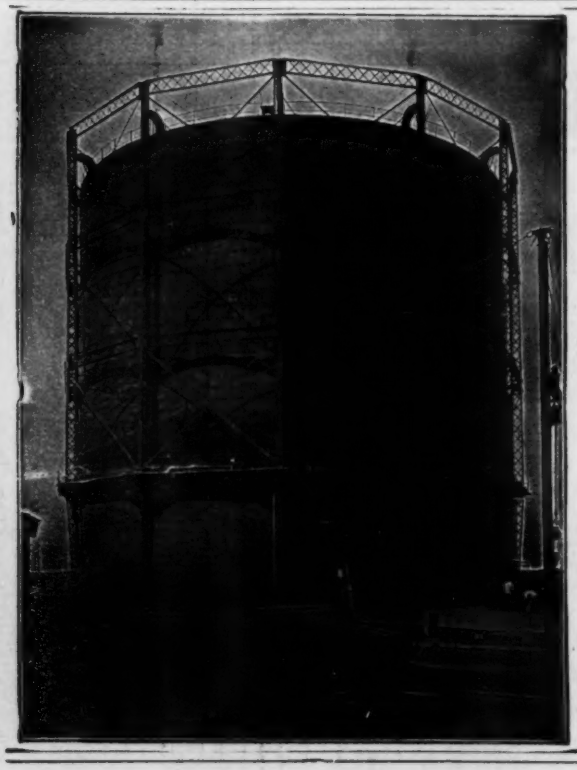

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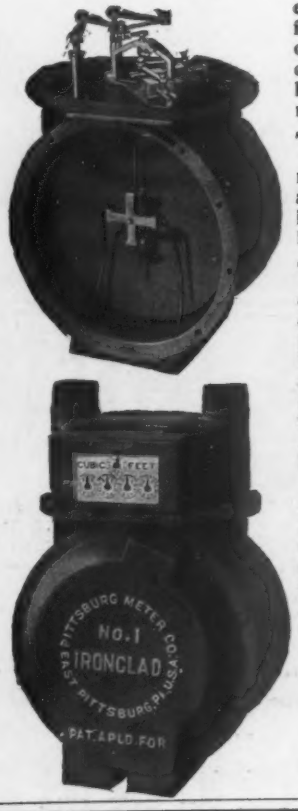

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